Social Capital In
Professional Learning Communities

By

David P. Conrady

Submitted to the Department of Educational Leadership and Policy Studies and the Faculty of the Graduate School of the University of Kansas in partial fulfillment of the requirements for the degree of:

Doctor of Education (Ed.D)

Dissertation Committee

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Dedication

I have been blessed to have a tremendously supportive wife and family who have encouraged me during this process. Without their support, this accomplishment would not have been attained. To my wife Jeanine, whose love, prayers, and support are why I am here and what has made this possible; to my parents, whose love and nurturing included instilling in me the value of education; to my children, thank you for making each moment meaningful, may you embrace learning and fulfill all of your dreams. I would like to extend a sincere and great big thank you to Jeanine, Paul, Kevin, Grant, Daniel and Mom for your patience through the years: From Dr. Dad to each of you.

ABSTRACT

The objective of this study is to investigate if the social capital of teachers within Professional Learning Communities (PLCs) increases student reading achievement. Professional Learning Communities (PLCs) have received little attention in sociology of education research. Drawing on organizational sociology, this research proposes a model of PLC social capital that treats brokerage (external ties) and closure (internal ties) as the key dimensions of team functioning as proposed by Ron Burt (2005). The model brings together insights from the limited research concerning how PLCs increase student achievement, and analyzes how the internal and external ties affect team function. Furthermore, using social capital theory, the model recasts the internal and external relationships within PLC as the building blocks of a unifying theoretical framework. OLS cross-sectional analysis will focus on answering the following questions.

- What is the effect of PLC social capital on student achievement?
- Where does innovation outside of the PLC come from?
- What is the catalyst of successful PLCs?
- How does the interaction of the degree of closure and the degree of brokerage foster a PLC's ability to increase student achievement?

This research will test the model using survey and student data of more than 7,500 students from a representative sample of 26 elementary schools in a large first-ring suburban school district. Analysis was of 162 PLCs. The analysis not only explores brokerage and closure patterns among PLCs, but examines the effect of PLC social capital on student academic outcomes. Results show a statistically significant increase in student reading performance and can be attributed to PLCs, where teams exhibit high levels of both brokerage and closure.

Chapter 1: Introduction of the Problem and Its Relevance

It has long been a key challenge for school districts and administrators to improve students' achievement by fostering meaningful professional development of teachers, especially since the criticism set forth in *A Nation at Risk (1983)*. In the last part of the 20th Century, researchers called for a change in teachers' professional development; that is, a system that is more specific to individual teachers and teacher-driven, rather than a one-size fits all (Hord, 1997). As a result of this demand, researchers and practitioners have used and supported Professional Learning Communities (PLCs) as the framework to deliver personalized professional development (Hord, 1997; Marzano, R., 1998; Mitchell and Sackney, 2000; Stoll et al.,2006; Toole and Louis, 2002). Professional learning communities are generally defined as small groups of educators that focus on student learning, work toward shared values and vision, and participate in frequent collaboration (Louis and Marks, 1998; Louis, Marks, and Kruse, 1996; Stoll et al., 2006; Toole and Louis, 2002). Research on PLCs indicates that schools with strong professional communities encourage teachers' professional development, produce increased student learning, and implement educational change more easily than schools lacking these elements (Lee and Smith, 1996; Louis and Marks, 1998; Newmann, King, and Youngs, 2000; Vescio, Ross, and Adams, 2008; Wiley, 2001). Although research on professional learning communities puts an emphasis on the relevance of teachers' trust in their social interactions and the value between teachers to support their own professional development and instructional change, scholars have long overlooked the fundamental element of professional learning communities: how the social interactions of teachers help educators raise student achievement (Coburn and Russell, 2008; Smylie and Hart, 1999). A key problem within the PLC literature is that it lacks not only elaborate research designs, but also any sound theoretical framework that

explains how PLC's social capital increases student achievement. This study addresses the lack of elaborate research designs and proposes a sound theoretical framework by considering PLCs from a social capital perspective. This perspective is borrowed from mainstream organizational sociology, as well as from an elaborate cross-sectional research design that examines PLC effects on growth in student achievement and aims at uncovering catalysts that exist in successful teams.

As a consequence, we know little about the social interactions that indicate the significance of teacher relationships in a professional learning community. Because this conceptual notion is of one of the key concepts underlying professional learning communities and is a main concern when PLCs fall short of set academic expectations, it needs more study (Westheimer, 1999; Toole and Louis, 2002). Still, after almost twenty years of promoting Professional Learning Communities, PLCs remain a relatively understudied topic in education research. Research into what makes PLCs successful, that is – the existence, operation, effectiveness and how to improve school capacity (Bolam, et al., 2005) and in what makes such teams successful – is in its infancy (Stoll, 2006). Little quantitative research on the effectiveness of PLCs exists. Most of the research on the effectiveness of PLCs reviewed by Vescio and associates in 2008 indicated a majority of the research to date was qualitative, with information gathered from interviews, observations, field notes, and meeting transcripts. Current professional development and school improvement literature is full of articles that praise the virtues of PLCs as essential ways to organize and improve professional development in schools; however most are from a non-pragmatic perspective. A more important perspective that needs to be investigated is the impact that PLCs have on changing teaching practices and increasing student learning. This study draws on the network view of social capital in organizational sociology to extend research on PLCs in the sociology of education. A common weakness in existing research

on PLCs has been the lack of a comprehensive theoretical framework that addresses the central dimensions of team functioning and the association of these dimensions with important educational outcomes (Land, 2002; Cistone, 2008). Moreover, the fundamental problem with PLC literature is the lack of focus on what PLCs are; that is, teams or formal task groups. The underlying question that has not been addressed and the focus of this research is, "What makes a formal task group effective?"

Social Capital Theory offers a unique solution that helps to resolve this problem. Social Capital Theory not only addresses internal ties, but also addresses external ties, which helps us understand what makes them effective. This research will focus on answering the following questions:

- What is the effect of PLC social capital on student achievement?
- Where does innovation outside of the PLC come from?
- What is the catalyst of successful PLCs?
- How does the interaction of the degree of closure and the degree of brokerage foster a PLC's ability to increase student achievement?

Social Capital Theory provides an advantageous perspective to these questions. The next section will review the components needed for Professional Learning Communities, introduce Social Capital Theory, and introduce an overarching, unifying theoretical perspective that explains what makes a PLC effective.

Chapter 2 – Professional Learning Communities

2.1 What is the concept of Professional Learning Communities?

The concept of Professional Learning Communities (PLCs) dates back to the response educators had to the 1983 publishing of *A Nation at Risk*, which identified many significant problems with the teaching profession and the failing education of American students; such as stagnation of teacher development and lagging of US student achievement scores. This report also criticized the superficial quick-fix mentality and isolated nature of America's public schools. During the decade following this report, educators were still trying to address the issue of our nation's failing schools. In fact, five years after the publication of *A Nation at Risk*, William Bennett (the Secretary of Education) in his resignation speech wrote, "Despite all of the talk of reform, despite the investment of tons of billions of extra dollars, public education in the United States is still a failure." (LA Times, 1988). However, Peter Senge's book *The Fifth Discipline* (1990) proposed a change in the current business philosophy but also a change in educational philosophy with the belief that "The most successful corporation in the future will be a learning organization. Where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together" (p.3). This concept settled into the educational literature of the 1990s and shifted much of the focus from "quick fixes" to the formation of "learning communities". Researchers like Hord, Fullan, and DuFour continued to apply and enrich the concept of "learning communities" and developed the concept into what we now know as Professional Learning Communities (PLCs). PLCs brought to schools a deepening of the learning capacity within an organization that encompassed improved teamwork and collaboration. More importantly, the concept of PLCs is not a teacher-proof

program, but a complex change in a school's culture that directly involve teachers, challenging them to change from a focus of teaching to one of learning for all (DuFour, 2004; Hord, 2004).

2.2 What are PLCs?

A detailed definition of PLCs as described by Bolster and Henley (2005):

> PLCs are small groups of teachers (2-5) working together on a regular basis for learning, joint planning, and problem solving. PLCs can be organized by grade levels, multiple grade levels, departments, interdisciplinary groups, or as intervention teams. The members of each group interact with each other and depend on each other for the accomplishment of specific goals. The group stays together long enough to form habits and conventions. An effective learning community cultivates an attitude of inquiry and focuses attention on student thinking and understanding. In a dynamic learning community, everyone learns. (p.1)

DuFour (2004) defines PLCs as a group of individuals who have committed to meet regularly for an agreed upon amount of time guided by a common purpose. PLCs provide a forum for learning, assessing, planning and reflecting as a team. The purpose and promise of PLCs is to create a collaborative environment where teachers can share, problem solve and set goals that will strengthen teaching and learning, thus resulting in improved student learning and outcomes.

Three components that are needed in every school or district for PLCs to thrive are: (1) a solid foundation consisting of collaboratively developed and widely shared mission, vision, values and goals; (2) collaborative teams that work interdependently to achieve common goals; and (3) a focus on results as evidenced by a commitment to continuous improvement (DuFour, 2004).

Key ideologies of Professional Learning Communities are the focus on learning outcomes, indicators of student success and the implementation of best practices. Professional Learning Communities are a tool by which schools and teachers can continue to grow professionally through their own internal capacity. The goal of PLCs is to help educators on the team become more knowledgeable about their curricular subject areas through collaboration during meetings

and through individual action research or work between team meetings, with the overarching purpose to increase student achievement. These are key components that would begin to break down the classroom walls to eliminate teacher isolation, a problem that has historically plagued schools, and to help schools successfully redesign themselves to become organizations that continually learn and innovate instruction to focus on student achievement. However, Hord (2004) and DuFour (2006) note that the presence of Professional Learning Communities will not guarantee any positive changes within school cultures. Key basic philosophical assumptions that members of a PLC must believe are true. Assumptions, such as;

- Collaborative cultures are more effective than teacher isolation;
- Improved student learning is most often linked to improved instruction and use of best practices;
- PLCs are a means of school improvement and professional development;
- Teachers learn best from other teachers in settings where they teach each other the art of teaching;
- Intervention is better than remediation;
- Isolation and competition are enemies of improvement;
- Some students need more time to learn and succeed than others;
- Teachers and schools can make a difference;
- PLCs focus more on learning than on teaching; and
- Teachers will share expertise to identify instructional practices that reflect the research of best practices in the areas chosen for improvement.

Additionally, there are necessary structural components, as identified by Hord (2004) and DuFour (2004) that are needed for PLCs to be successful:

- PLC meetings are guided by agreed-upon norms;
- Regular, structured time and district support is required for PLCs to be successful;
- Every teacher will equally participate in a PLC or team;
- Every team will establish SMART goals for curricular objectives;
- The PLC team needs to have strategies for accountability and strategies for keeping things on track;
- Members of the PLC will utilize expertise both from within the group and from outside the school environment to improve academic results in the areas identified for improvement;
- Student data is gathered through formative assessment or universal screening assessments; and
- Student data is shared and analyzed by each teacher in the PLC.

Ultimately, the key to an effective PLC is to have an unwavering focus on improving student achievement; through, the collaboration and sustained evaluation of how teachers instruct and deliver systematic interventions to students.

Literature on PLCs, however, much like any other school improvement initiative, the mere presence of a PLC does not equate to a positive change in student achievement (DuFour, 2006). If the focus on student learning, trust and dialogue is lacking in PLCs then they may suffer from DRIP syndrome (Data Rich Information Poor). This occurs when lots of student data is collected but not used to drive instructional decisions. Over the past two decades researchers have identified five dimensional characteristics that are present when PLCs make positive impacts on student achievement. The five dimensions are: 1) shared and supportive leadership; 2) shared values and vision; 3) collective learning and application; 4) supportive conditions; and 5) shared personal practice (Huffman and Jacobson, 2003).

The Southwest Educational Development Laboratory (2000) suggests that human interactions are the most important aspect that make or break PLCs. Such interactions include teacher attitudes towards schooling and students, collegial relationships among teachers, and the willingness to share personal practice with colleagues. This notion of productive collaboration in PLCs is contingent upon the effectiveness of the professional dialogue, teacher learning, trust and ultimately the teamwork among individuals in the group.

Traditionally, PLC literature has ignored the negative human relational by-products that collaboration produces (DuFour et al., 2005).Naively, many school leaders believe that PLCs will increase student achievement if there are established norms to build group cohesion and congeniality and the necessary teaming structures (ex – common planning time, close proximity,

common curricula) are provided (Harvey & Drolet, 2006). However, to better understand what makes PLCs effective, this research will turn to literature from military-based command and total quality management. Levi (2001) defines successful teams as "task groups that complete their tasks, maintain good social relations, and promote members' personal and professional development." Harvey and Drolet (2006) offer seventeen characteristics that define effective teams. These characteristics are divided into four distinct categories: purpose of the team, composition of the team, interaction between members of the team, and team structure and context. These four areas are further broken down as follows:

Purpose
1. Common identity and tenets
2. Common tasks
3. Sense of potency/ success

Composition
4. Clear definition of team membership
5. Recognition of individual contributions
6. Balanced roles

Interaction
7. Mutual trust
8. Sense of relationship
9. Open/direct conflict
10. Common base of information
11. High-level question asking and listening
12. Healthy level of stress
13. Toleration of errors
14. Flexibility and responsiveness

Structure and Context
15. Clear understanding/ acceptance of group structure
16. Periodic attention to group maintenance
17. Recognition and mitigation of outside sources

More recent literature has indicated that areas in which PLCs fall short are the development of mutual trust, having procedures in place to address team disagreement and including a developed sense of high-level questions into instructional practices (Hord, 1997). Huffman and Jacobson (2003) contend, "Without a climate of trust and respect and structures in place that promote

continual learning through discourse, it is impossible to build a Professional Learning Community" (p.26).

There is insight already offered in the existing PLC research; however, those insights do not consider any underlying or unified theoretical perspective. Social Capital Theory effectively helps address the human inter-relational problems looking at the social interactions – closure (trust and collaboration) and teacher professional development – brokerage (where innovation comes from). The next section will address Social Capital Theory and, more importantly will apply it to the study of PLCs on team and group effectiveness.

2.3 – Social Capital Theory

The concept of Social Capital has seen a rise in popularity in research due to the increased demand of worker collaboration in the last two decades. Social Capital treats social relationships as a form of capital; it proposes relationships, strong or weak, as a resource in which people can then draw on to achieve their goals. It also serves alongside other forms of capital (such as economic, human, cultural, identity, and intellectual) as a possible resource and accepted contributor to our individual, community, and workplace successes. The notion of social capital is said to have first appeared in J.L. Hanifan's discussions of rural school community centers (Hanifan 1916, 1920). He used the term to describe those tangible substances that count most in the daily lives of people. Hanifan was particularly concerned with the cultivation of good will, fellowship, sympathy and social relations among those that "make up a social unit". Significant contributions from Pierre Bourdieu (1986) with regard to social theory, and James Coleman (1988) in his discussions of the social context of education, moved the idea into academic debates. However, it was the work of Robert Putnam (1993a, 2000) that launched social capital as a popular focus for research and policy discussion. Putnam (2000) saw social

capital as the importance of connections among individuals –"social networks and the norms of reciprocity and trustworthiness that arise from them". In that sense social capital is closely related to what some have called "civic virtue." The difference is that "social capital" calls attention to the fact that civic virtue is most powerful when embedded in a sense network of reciprocal social relations. Putnam used this concept to explain how a society of many virtuous but isolated individuals is not necessarily rich in "social capital". The World Bank, an underdeveloped nation's lending bank, has used this as a central theoretical concept: "relationships matter" and the interaction among people build communities because people commit themselves to one another to attain a commonly held goal. It is this "trust" between individuals that becomes the trust among strangers and the broad fabric of trust among social institutions, such as schools (Beem, 1999). Without this complex interaction of individuals, trust decays and so does the reciprocity of trust among the individuals in a group.

It is this notion of social capital, the connections among individuals and networks, which researchers such as Putnam (2000) and Burt (2009) believe function as conduits for the flow of helpful information that facilitates the achievement of an organization's goals. There is a growing body of research that suggests that where trust and social networks flourish, individuals, firms, neighborhoods, and even nations prosper economically (in the case of education, in the form of increased student achievement). More particularly, the benefits of institutions that have established policies and frameworks in place to allow effective professional social interaction and networks include:

- Better information and knowledge sharing, due to established trust relationships, common frames of reference, and shared goals.
- Lower transaction costs, due to a high level of trust and a cooperative spirit (both within the organization and between the organization and its customers and partners).

- Low turnover rates, reducing severance costs and hiring and training expenses, avoiding discontinuities associated with frequent personnel changes, and maintaining valuable organizational knowledge.
- Greater coherence of action due to organizational stability and shared understanding. (Cohen and Prusak, 2001).

In fact, Cohen and Prusak indicate in their 2001 research that social capital can help to mitigate the negative effects of being socioeconomically disadvantaged. One social capital theory, that of Ronald Burt (2005), provides a theoretical framework that describes the complex relationships found in formal task groups or teams such as PLCs. The typology and theory proposed in his 2005 work includes the concepts of closure and brokerage and the interaction between the two. Closure refers to the tightening of coordination on a closed network of people (within a PLC) such as advice, coordination, cooperation, friendship, gossip, knowledge and trust. Brokerage is the networking web of people that PLC members communicate with that are outside of their PLC. This could be other grade level teachers, teachers at other schools or through external relationships through professional development activities. Brokerage and Closure explore how these elements work together to define social capital, showing how PLCs works together to better educate students. However, the social capital relationships of brokerage and closure may not always combine to produce results towards positive ends. An example of the complexities of the negative effects of social capital is violent or criminal gang activity that is encouraged through the strengthening of intra-group relationships (closure). The negative consequences of social capital are more often associated with closure of groups rather than the brokerage. In the case of PLCs that lack "brokerage" social capital, groups can become isolated and disenfranchised from best practices because they lack connections outside of the PLC. Brokerage must occur to denote an "increase" in social capital and student achievement. Burt proposes that closure is a necessary antecedent for the development of the more powerful form of brokerage social capital (2005). Closure and brokerage social capital can work together

productively, if in balance, or the two may work against one another. The next section will continue to develop and apply Burt's typology to PLCs as a unifying theoretical perspective to describe what makes PLCs effective.

2.4 – Social Capital and Professional Learning Communities

To better understand the pattern of professional social interactions among teachers that shape the valuable outcomes associated with strong professional communities, this study draws on the concept of social capital. The leading authorities on social capital theorize that individuals are situated in networks of social relationships that provide access to resources residing in these social networks (Bourdieu, 1986; Putnam, 1993b). For this research, Social Capital will be defined as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Coleman, 1990; Putnam, 1993a; 1993b). Social capital encompasses both the internal and external networking relationships and assets may be utilized through a network (Bourdieu, 1986; Burt, 1992; Lin, 1999; Nahapiet and Ghoshal, 1998).

Until recently, Social Capital Theory has mainly referred to the social capital of students and their families. This research seeks to explain the effect of peer social capital on educational outcomes, such as student achievement (Coleman & Hoffer, 1987, Goddard, 2003; Lareau and Horvat, 1999; Putnam, 2000; Ream and Rumberger, 2008; Teachman et. al. 1996, and Dika & Singh 2002). However, organizational literature points to the value of social capital in organizational contexts (Leana and Van Buren, 1999; Nahapiet and Ghoshal, 1998, Saatcioglu, 2010). These studies propose that social capital contributes to the achievement of each organization's goals by facilitating the flow of information between individuals and overcoming

problems of coordination (Adler and Kwon, 2002; Lazega and Pattison, 2001; Lin, 2001; Tsai and Ghoshal, 1998; Walker, Kogut, and Shan, 1997).

At its core, this body of work typically addresses the implications of relational ties and associated norms for schools and students (Dika and Singh, 2002). While the predominant conception of social capital in organizational sociology focuses on the issue of relationships; it emphasizes the structure of "networking" among individuals, groups, and organizations (Salancik, 1995). The cultivation of social capital leads to the belief that an advantage can be accumulated for a focal actor to accomplish objectives that have been set forth. Social Capital Theory explains how actors accomplish more due to the gain in resources from their connections with other actors (Uzzi, 1996).

At the individual level, social capital is determined by the intensity and scope of ties to others in close proximity as well as to those at further reaches of the network space (Granovetter, 1973). In the context of an organization or group—such as a PLC —social capital is a function of closure or the cohesive, tight-knit internal ties among members, as well as the diversity of weaker, yet influential ties that members have with external actors, known as brokerage (Coleman, 1990; Putnam 1993, 2000). Despite this conceptual notion, much of the empirical research that draws on this perspective doesn't address the internal or external network ties and rarely addresses both simultaneously (Krackhardt, 2010). While previous research suggests that teachers' professional relationships foster a climate of trust and a 'safe' environment to engage in innovative behavior and risk-taking in reform efforts (Bryk and Schneider, 2002; Louis, Marks, and Kruse, 1996; Moolenaar, Daly, and Sleegers, 2009; Penuel, Fishman, Yamaguchi, and Gallagher, 2007), empirical evidence on the interrelatedness of the two major constituents of social capital in school organizations, social networks and trust, is missing.

Among the Social Capital Theories, the one that best explains PLCs and formal task groups is Ronald Burt's typology and its emphasis on the interrelatedness of trust (closure*)* and social networking (brokerage). Since PLC functioning involves social interaction among members and cannot fully isolate themselves from their social and organizational environment, the effectiveness of a PLC is likely to be influenced by both internal and external member relations (Cistone, 1975; Carol et al., 1986; Danzberger and Usdan, 1994). Burt's (2005) work on social capital and its effects on organizational effectiveness is uniquely instrumental in this regard. His 2005 work treats internal and external ties as facets of social capital that cannot be studied separately from one another. A formal task group's effectiveness in accomplishing formal objectives is an inherently combined result of the degree of closure within the group—influencing trust, cooperation, and reputation among members—and the degree of brokerage with other entities on the outside—fostering the group's creativity, innovation, diversity, and capability.

Drawing on Burt's approach and applying it to PLCs, PLC social capital is defined as a function of closure – i.e., the nature of internal member relations, affecting harmony, efficiency, and decision-making quality – and brokerage – i.e., the diversity of member interactions with external actors (such as other building PLCs and district level trainers, school administrators, staff development personnel, professional organizations, resource and instructional specialists and external educational contacts), which affects innovation, legitimacy, and support for the PLCs. This study will explore not only brokerage and closure patterns for PLCs, but will try to identify the catalyst that makes PLCs successful by using two different achievement levels on research-based reading inventory, *DIBELS Next.*

Burt's Social Capital typology creates a universally creative perspective that addresses not only the internal dynamics of a group but also its external ties in a way that helps clarify how these formal task groups are effective and how they affect student achievement outcomes. For this reason, brokerage and closure may seem somewhat disjointed because they have not been viewed as part of a unifying theoretical framework. The next section reviews the literature on to brokerage and closure in PLCs, and then discusses a conceptual typology that brings these issues together and suggests implications for school level outcomes.

2.5 – Closure in PLCs: Internal Ties

Closure is described in terms of the norms, values, and expectancies that are shared by group members (Bourdieu, 1986; Halpern, 2005; Portes, 1998). In Social Capital literature, trust among organizational members is identified as the most important trait characterizing a community (Nahapiet and Ghoshal, 1998). Trust can be defined as an individual's or group's willingness to be vulnerable to another party who shows benevolence, reliability, competence, honesty and openness (Cummings and Bromiley, 1996; Tschannen-Moran, 2004). Trust is a basic building block of effective professional learning communities (Rotter, 1967; Lencioni, 2005). Trust is important for the development of a collaborative school culture, increasing the quality of schooling, and student achievement (Goddard, Tschannen-Moran and Hoy, 2001; Hoy, 2002; Hoy and Sabo, 1998; Tschannen-Moran, 2004). Trust, according to Bryk and Schneider (2002), allows teachers to be vulnerable and open to new and shared learning experiences that are central to ongoing teacher development. Thus, improving the quality of instruction and student learning becomes an individual and collective endeavor, motivating teachers to engage in instructional innovation and to be more willing to take risks if done in a safe environment. Research has shown that trust has positive effects on teacher professionalism (Tschannen-Moran,

2009; Tschannen-Moran and Hoy, 1998) and teachers' motivation (Smylie, 1999). Internal dysfunction within formal tasks units, such as PLCs, undermines productivity and aggravates turnover and benevolence (Tschannen-Moran, 2004). Internal dysfunction in a formal task group prevents collective creativity from taking place, decreasing the likelihood that PLC members will work collaboratively in sharing and seeking knowledge, skills and instructional strategies and in planning collectively to solve problems and improve student learning opportunities (Huffman & Jacobson, 2003). Some barriers to positive, shared personal practices within PLCs are: the lack of trust; lack of healthy conflict; and absence of true collaboration. Without these three components, team relationships are damaged (Wiseman, 2008). The mere placing of people into groups does not necessarily mean the individuals will work together effectively. Research and common knowledge tells us that teams do not become teams just because someone labels them a team (Katzenbach & Smith, 1993). High levels of closure in groups charged with a formal task bring about a culture that enables efficient decision-making, mutual accountability and consensus (Putnam et al., 1983). Closure mitigates opportunism and the pursuit of like interests (Putnam, 1993a; Williamson, 1996). Conversely, in PLCs with low levels of closure, members may function as delegates of special interests in the team rather than as trustees charged with pursuing common goals that reflect shared interests (Campbell and Green, 1994). Such dynamics can be particularly polarizing. Therefore, cultivating closure within the PLC may play a considerable role in facilitating educational progress.

According to Nahapiet and Ghoshal (1998), closure can be improved by investing in the structural, relational, and cognitive aspects of interaction. Investment in these three aspects of closure can be mutually amplifying (Leana and van Buren, 1999; Adler and Kwon, 2002).The structural aspect involves information sharing, which stimulates openness, learning, and

reflection (Sparrow et al., 2001).The relational aspect refers to trust and the fostering of efficient collaboration and coordination in the absence of explicit mechanisms to reinforce such behaviors (Coleman, 1990). The cognitive aspect of closure refers to the issue of shared vision. Leana and Pil (2006) note that the unity of goals helps create a sense of shared responsibility and joint action. It reduces free-riding, indifference, circumvention and passive–aggressive actions, allowing more effective discussions concerning the means to achieve goals and on the criteria for evaluating outcomes (Portes, 1998). Trust improves shared information (Bradach and Eccles, 1989), and information facilitates the adoption of a shared vision and the transmission of common values (Mohammed and Dumville, 2001). A study by Harvey and Drolet (2003) proposed that effective PLCs are driven by a purpose and its members have a hunger to attain the goal they have set forth to accomplish. These groups are strong, cohesive and share a clear purpose of identity and united direction. Another key to forming strong teams is the constancy of its members. The strongest teams, which function at high levels, are those that have clear and explicit knowledge of its members. Inversely, when the member boundaries are unclear of who makes up the group, the group is less a team and less effective (Harvey and Drolet, 2003). Blasé and Blasé (1999) argue that as schools become more collaborative, collegial and democratic, they become more political. Achinstein (2002) warns that when administrators and teachers enact collaborative reforms without a clear purpose in the name of 'community,' what emerges is often conflict. But he also argues that conflict is central to an effective community. In Stephen Covey's book, *The Speed of Trust*, he writes:

> Low trust causes friction, whether it is caused by unethical behavior or by ethical but incompetent behavior… Low trust creates hidden agendas, politics, interpersonal conflict, rivalries, win-lose thinking, defensive and protective communications – all which reduce the speed of trust (Covey and Merrill, 2006).

Five dysfunctions that typically prevent goal attainment and plague teams are: (1) the absence of trust; (2) lack of commitment; (3) fear of conflict; (4) avoidance of accountability; and (5) inattention to results (Lencioni, 2005). It is how teachers, and a school system, manage conflicts, whether they suppress or embrace their differences that define the ultimate potential for organizational learning and change. Lickona and Davidson claim, "Great schools row as one," they pull in the same direction in unison. The best schools are tightly aligned communities marked by a common purpose and shared identity among staff. More importantly, these schools have mechanisms in place to deal with negative discourse among staff. In contrast, struggling schools are fractured, with many staff members not working toward the same goals (2006). All in all, DuFour calls effective teams the foundation of Professional Learning Communities (2006); however, there is little in PLC literature that pays substantial attention to team effectiveness.

2.6 – Brokerage in PLCs: External Ties

The concept of brokerage – i.e., the diversity of member interactions with external actors (such as other building PLCs and district level trainers, school administrators, staff development personnel, professional organizations, resource and instructional specialists and external educational contacts), directly affects innovation, legitimacy, and support for the PLCs. Reliance on strong internal ties may in itself result in conformity to a degree that is counterproductive (Uzzi, 1996; Burt, 2005). Group performance is therefore also a function of weak, external ties. The precursor of this approach was Granovetter's (1973) influential study, which illustrated that individuals have a better chance of finding employment through their weak acquaintances than through their close friends and family.

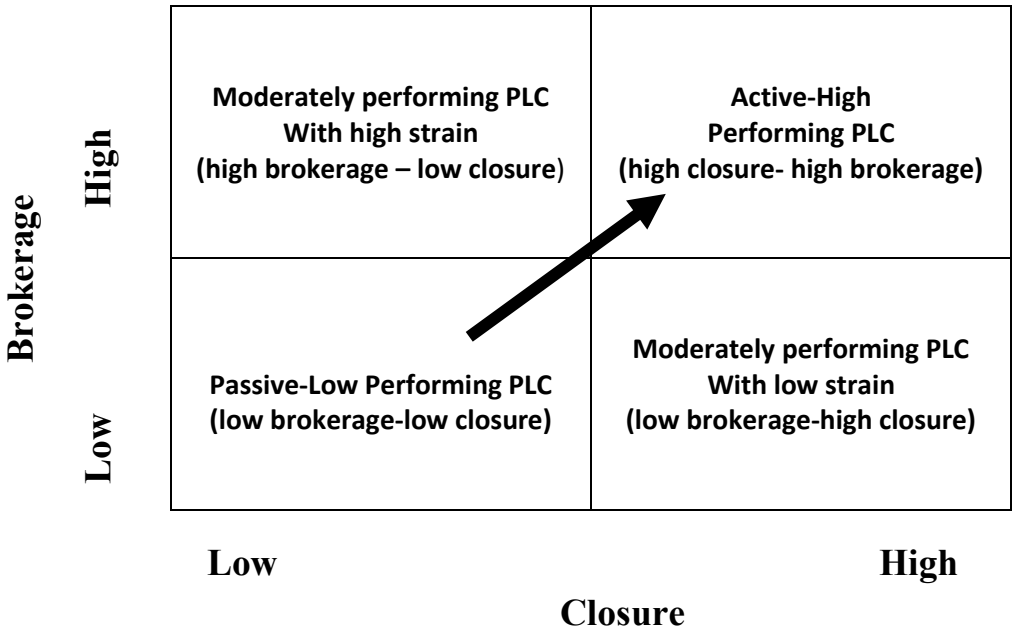
Close-knit networks are characterized by redundant ties, as everyone in the group is familiar with everyone else; brokerage is accomplished when members reach outside to others who have new ideas and resources that the group does not already know about (Burt, 2005). Social capital Theory conceptualizes how social relationships enable individuals to have access to, and make use of, the resources that reside in their social networks. Social Capital Theory is seen as a promising theory to increase our understanding of the crucial and valuable role of social networks among teachers in professional learning communities. Social networks support PLCs through the transfer of knowledge, joint problem solving, collective orientation towards innovation, and reform implementation (Coburn and Russell, 2008; Daly and Finnigan, 2009; Penuel, Frank, and Krause, 2007). Brokerage is also important in forming alliances (Leana and Barry, 2000), managing uncertainty and securing legitimacy in the eyes of stakeholders (Pfeffer and Salancik, 1978).

Hess (2008) notes that formal task groups, such as PLCs, are having more influence over educational practices within schools and could help or hinder reform efforts. Therefore, team member ties to these groups could facilitate or hinder the team's capacity to constructively manage conflicting demands. Another area where brokerage is likely to be beneficial is classroom instruction (through the sharing of ideas and knowledge or from the exposure to different styles of instructional philosophy). Finally, team member ties to other schools and universities are often beneficial, as a source of innovative strategies for school organization (Antelo and Henderson, 1992; Scales et al., 2005) and curricular adjustment and career choices for students. Likewise, the teacher's interactions with universities tend to be valuable in terms of access to new ideas for educational practices, academic progress, and teacher and staff development (Fullan, 1995).

2.7 – Social Capital Typology to Understand PLC Effectiveness

Burt's (2005) approach to social capital offers a unifying perspective that draws together seemingly distinct insights on internal and external ties of Professional Learning Communities. His typology, shown in Figure 1, not only addresses combinations of brokerage and closure, but outlines a specific outcome pattern across these combinations. The flow pattern of increasing social capital is from the lower-left to the upper-right. The degree of social capital and its outcomes are contingent upon the pattern of co-occurrence of brokerage and closure. Benefits of brokerage should be higher where closure works with brokerage to enhance coordination across "structural holes" (i.e., weakly tied actors) that might normally be closed to an advantage (Burt, 2005). By contrast, returns should be lower where closure works against brokerage to coordinate across structural holes are left open, causing an effect of stagnation.

Figure 1 - Theoretical Framework for PLC – Social Capital Typology



What this translates to with regard to a formal task group is that performance moves from low levels of brokerage and closure to increased closure or brokerage to, ultimately, a state where

both closure and brokerage are high. Therefore, while brokerage and closure may each have implications for outcomes, it is necessary to consider higher-order combinations of the two. Burt describes the social capital configuration where brokerage and closure are both at high levels as the "structural autonomy" configuration. Burt notes (2005) that groups consist of people strongly connected to one another, with extensive relations beyond the group. The internal ties of a group play an important role in overcoming barriers to building an effective PLC. These PLCs possess which includes conflict resolution skills; a structurally autonomous group with a strong reputation mechanism aligning people inside the group, and a strong vision advantage from brokerage outside the group. They have a creative view of valuable projects, who to involve, and they work together to make it happen. Burt's theory suggests that higher levels of brokerage in Professional Learning Communities would provide structural component for school administrators to develop that can close "structural holes" that may exist in moderate to lower performing teams.

A number of studies in organizational sociology offer support for Burt's model. For instance, Saxenian (1994) found that Silicon Valley's financial and technological success was a function of efficient organizational design within firms, coupled with effective knowledge sharing and coordination across the firms. Similarly, Ancona and Cladwell (1992) determined that goal accomplishment by project teams in various sectors was most likely when both the quality of within-team communication and the functional diversity of members were high (Reagans and Zuckerman, 2001, and by Reagans, Zuckerman, and McEvily, 2004). By applying this approach to PLCs, this study makes the following prediction with regard to two specific performance measures:

Null *Hypothesis.—Student achievement outcomes will be higher in PLCs with higher closure and brokerage values.*

There is emerging evidence in research on PLCs supporting this hypothesis, particularly concerning student academic achievement. Burt's study, therefore, hints at the importance of brokerage and closure by PLCs.

2.8 Student Achievement in PLCs

As an alternative, a sociological view of social capital views PLC members' internal and external ties as strategic resources for the PLC, and subsequently as predictors of student achievement outcomes.

This study will focus specifically on the growth over time in student reading achievement. Achievement outcomes are critical in the context of high stakes testing and accountability, where schools are pressed to demonstrate significant gains in student performance and at the same time increasingly lack adequate human and monetary resources to allocate to instruction-related spending. This creates a dual problem for school leaders. On the one hand, affecting test scores is a notoriously complex process, as performance is influenced by various student, school, and non-school factors. On the other hand, most schools have found that traditional professional development and sustained improvement is very difficult to achieve. This study is about the relationship between teacher brokerage-closure and achievement. Burt's theory suggests that PLCs with high levels of social capital (ie-brokerage and closure) will be more effective in meeting academic challenges, and in sustaining favorable outcomes in the long run.

Closure is likely to engender unity and efficiency in PLCs for developing approaches that stimulate and focus the team's energies in improving student success. Cohesive teams find it

easier to establish means of monitoring student progress (Alsbury, 2008), holding team members accountable, helping align the curriculum to testing standards, restructuring teacher instructional practices (Henderson et al., 2001), and initiating professional development programs for teachers, participation programs for parents, and tutoring programs for students. Closure may also increase the ability to formulate more effective ways to manage classrooms and to deliver instruction (Stover, 2009). Likewise, brokerage can improve the PLCs capability to draw on the know-how, creativity, and support of external actors in innovation and implementation and in other ways of supporting students and colleagues (McDermott and Jensen, 2005). This may be particularly beneficial with regard to federal policies such as NCLB, where the means of implementation are highly ambiguous (Loveless, 2007). A PLC with diverse and frequent external ties can muster support for ways to implement innovative practices from various external groups and other influential actors (Smoley, 1999), helping to justify the required curricular changes, testing policies, and new strategies for instruction. High levels of brokerage can expose the PLCs to new ways to improve instruction and increase student achievement.

Conclusion

This study does not account for the longitudinal (lagged) effects of PLC social capital; however, data is being collected and further study will examine lagged effects of PLCs. It cannot differentiate the direct components of these effects from indirect ones, as this would require extensive data on a variety of other actors and mechanisms. This study will address the total effects of the PLC, which consist of direct and indirect effects. The analysis is based on the precept that examining direct and indirect effects requires first the substantiation of total effects (Baron and Kenny, 1986). Assuming that total effects are decomposable into direct and indirect

parts with more elaborate data, this study tests the internal and external relationships within PLCs and their overall influence on achievement outcomes.

Chapter 3 - METHODOLOGY

3.1 Introduction

The purpose of this study was to determine if closure or brokerage within Professional Learning Communities (PLC) can influence the amount of innovation and student reading achievement as measured by DIBELS Next reading inventory.

The overarching question for this research is: What is the effect of PLC social capital on student achievement?

1. Where does innovation outside of the PLC come from?
2. What is the catalyst of successful PLCs?
3. How does the interaction of the degree of closure (trust, information sharing & shared vision) and the degree of brokerage with professional networking on the outside foster a group's creativity, innovation, best practices, and ability to increase student achievement?

3.2 – Data Sources

Participant schools

The study relies on data from a suburban Kansas school district for the 2011-12 school year. The selection of the school district participating in this study was purposefully selected due to its convenience and location. The student demographics are statistically similar that of the state of Kansas. However, teacher demographics may be a little different from the state averages as this district provides teacher compensation that is in the top 5% of school districts in that state of Kansas; which traditionally has provided a large pool of applicants for each teaching position. Because of this, the experience and education attainment of the teachers in the selected district may be greater than other school districts in the state of Kansas. The district website lists that

80% of teachers have earned Master's degree in education. In regards to how teacher instruct in PLCs, each teacher is responsible for instructing their own reading, language arts, and mathematics instruction. In many PLCs, teachers exchange students for science and social studies instruction.

In the spring of 2012, a questionnaire concerning social capital scales and other measures was sent out to Kindergarten through 6th grade teachers in 26 of the 35 elementary schools in the study district. This district was selected because of convenience and was selected due to its diversity in student demographics and school populations. This sample includes 26 schools, more than 568 respondents, and 196 different PLCs, and contains more than 12,250 students nested within the PLCs. School sizes range from 240 to 650 students in grades K-6. Each member of a PLC received a copy. This sample is reasonably representative of the district (including varying degrees of SES status, school size, racial diversity, and teacher experience). The average return rate on surveys was 71%, with a range of 22% to 100%.

School Level Characteristics, Teacher, & PLC Level Controls –

- An analysis of the data was examined using OLS to control for any school level characteristics that could account for changes in students' academic reading growth. School level controls include 1) if a school has implemented Positive Behavior Intervention Supports (PBIS) and how many years a school has implemented this behavior program; and 2) if a school has Title I status, which in this school district accounts for schools that have a free and reduced student population of 47% or more. Other factors, such as principal leadership style, support of parents, use of technology, room temperature, paint color, or any other possible factors within schools, were controlled for.

- Teacher-level controls include the following categories: number of years taught, number of years taught at current grade level, number of years in district, number of years at school, and the number of years current PLC members have taught together.
- PLC level controls include teacher perceptions of collaboration and the level of collaboration PLC members receive from the district, principal, and colleague levels. Specifically, PLC members were asked to indicate how useful collaboration is for their grade level, for teachers at the school, and for student learning. Additional instructional-level controls include how often teachers share students, use ability level instruction, establish SMART goals for students, and review student data.
- Sample data population controls include student race (white, Hispanic, black, mixed, Asian, or American Indian), gender, SES (free, reduced, or no support), ELL (ELL status or not ELL), and SPED (not disabled, disabled or gifted).

3.3 Student Achievement Measures –

To measure student reading achievement growth this research is using Dynamic Indicators of Basic Early Literacy Skills or *DIBELS Next*, to measure the change in reading ability growth. *DIBELS Next* is comprised of a set of standardized procedures and measures for assessing the acquisition of early literacy and reading skills from kindergarten through sixth grade. *DIBELS Next* has been found to be reliable and valid for assessing the acquisition of early literacy skills of children who are learning to read in English in the United States. The *DIBELS Next* assessments correspond to the five basic early literacy skills and include indicators of phonemic awareness, alphabetic principle and phonics, vocabulary and oral language development, accuracy and fluency with connected text, and reading comprehension. *DIBELS Next* data is collected at routine benchmarking dates in the fall, winter and spring of each year.

Each *DIBELS Next* assessment is administered individually in one-minute timed sessions. These assessments include: Letter Naming Fluency; First Sound Fluency; Phoneme Segmentation; Fluency; Nonsense Word Fluency; Oral Reading Fluency; Retell; and Daze (DIBELS-maze group-administered; 3 minutes). *DIBELS Next* is a comprehensive reading inventory instrument that measures phonics & phonemic awareness, oral reading fluency (DORF), and DORF accuracy. There are two components that measure reading comprehension: DAZE and a retell of the DORF. These individual assessment scores are organized to form a composite score using the following formula:

Composite score = (DORF words correct) + (DAZE score X 4) + (Accuracy Value).

DIBELS Next was designed for use in identifying children experiencing difficulty in the acquisition of basic early literacy skills in order to provide support early and prevent the occurrence of later reading difficulties. As part of the formative assessment process, *DIBELS Next* were designed to evaluate the effectiveness of interventions for those children receiving support in order to make changes when indicated to maximize student learning and growth. *DIBELS Next* data provides a key piece of reliable information and help schools using a Multi-Systems of Support (MTSS) approach to identify children with learning deficiencies, and to provide intervention support. A key to the success of increasing each student's reading ability is a regular review of the data,(benchmark and progress monitoring data), to identify, plan early intervention, and monitor the progress of struggling readers (Fuchs & Fuchs, 2006). These sets of measures generally take 1 to 5 minutes to administer and score; yet provide data that is highly relevant to instructional planning. Each measure is highly sensitive to small, but important changes in student performance. Because of these design features, *DIBELS Next* can be administered over time. Thus, differences in scores are attributable to student growth, not

differences in the materials or assessment procedures, and educators can compare assessment results over time (Good et. al, 2004).

Student Baseline data is from the winter 2012 *DIBELS Next* scores. This student data is nested in and assigned to grade-level teachers and PLCs. Spring benchmarking data was collected for all K– 6th grade students in study schools. Student growth was calculated by subtracting the spring score from the winter benchmark score in each of the major categories: composite score, oral reading fluency (DORF), DAZE, and retell. The composite score provides valuable information such as speed and accuracy in reading fluency and student comprehension of text. The formula to calculate student reading growth is below:

Student reading growth = Spring DIBELS Composite score – Winter DIBELS Composite score

Additional academic measures collected include fall and winter/spring NWEA MAP scores and the 2012 Kansas Assessment results. MAP is a nationally normative computer adaptive assessment. The 2012 Kansas Assessment is given in the spring of each academic year as part of compliance with NCLB and state accreditation mandates.

3.4 – Survey Instruments

Closure

The measure for closure was based on Leana and Pil's (2005) five-point scale about the structural, relational, and cognitive aspects of internal ties. Participants were asked if they strongly disagree, disagree, neutral, agree, or strongly agree for each statement. Survey statements ask participants to review structural aspects of their PLC to addresses openness, honesty, frequency, and willingness in information sharing. The relational aspect includes questions on trust, respect, integrity, team spirit, and confidence. The cognitive aspect focuses on shared vision, including similarity of views concerning the PLCs purpose and the degree of equal participation in goal-setting.

Brokerage

Brokerage will be measured by a seven-point scale, based on the work of O'Toole (1997) and Meier and O'Toole (2003). Respondents were asked to rate the frequency of their interaction with 3 tiers of external actors—such as brokerage relationships within PLCs, within the school level, district level or external educational institutions or professional affiliations. Participants' responses rated their frequency of collaboration as never, rarely, a few times per year, monthly, weekly, or daily. The scores on the original seven-point scale were converted to scores on a six-point scale for brokerage. This instrument measures brokerage collaboration in three levels: Tier 1, Tier 2 and Tier 3. A summary of each level is shown below in table 3.1.

Measures

A full list of all the constructs and related items included in the questionnaire used is provided inTable 2 in the Appendix. The sources and properties of the constructs are described below in table 3.1.

Table 3.1 – Types of and Components of External Ties of the PLC

Tier 1Brokerage *Collaboration within the school*	**Tier 2 Brokerage** *Collaboration not in the school, but within district resources*	**Tier 3 Brokerage** *Collaboration not in school or district*
• Teachers on grade level team • Teachers in school but at other grade levels • School administration • Special Education Teacher • Reading/Math specialist • School Social Worker/Counselor • Professional Development offered at school • School psychologist	• District subject area C&I specialist • Mentor others/has mentor • District technology trainer • District Assessment & Research office • District professional development courses • District specialist (MTSS, PBIS, Autism, Behavior) • Participates on curriculum council • With other teachers in a Book study • Summer academy, pre-service professional development • With teachers from other district schools	• With educators from other school districts • Graduate level coursework • Members of professional educational organization • Participation in action research • Partnership with state agency (CETE, NEA, state level committees)

3.5 – Survey Procedures

Below is a step-by-step chronology of how the survey was conducted, including email contacts and follow up procedures. Permission from the Human Subjects Committee University of Kansas, Lawrence Campus (HSCL) was requested, and approved, to conduct this study.

1. A pre-notice email was sent to all selected educators in the Midwestern school district. This was conducted 3-5 days prior to an email requesting participation in the actual survey.
2. The formal request to participate included the cover letter approved by the University of Kansas HCSL Committee and link to the electronic survey. By clicking the survey participation link on the informed consent the participants will indicate their willingness to participate. Each participant can choose at any time to exit the survey.
3. A follow up request will be sent out through email 5-7 days after the first request to complete the electronic survey. This will include a thank you to those who have already completed the survey and will urge those who have not do so to do so right away.
4. A final follow up email request will be sent out 10-14 days after the original request to participate if survey results show a low return rate.

3.6 Limitations of data

This study included the following limitations:

- This study is limited to the perceptual information from survey data gathered from school educators.
- Due to time constraints, this study is limited to a cross-sectional analysis of the 2011-2012 academic school year. Ongoing data collection is still ongoing for further study of longitudinal effects of PLC brokerage and closure on student achievement.

- Teacher data did not include educational levels of teachers; this is an additional control measure being collected in longitudinal data being collected.
- Student data did not include traditional household controls such as number of parents in household or parents educational attainment.

Chapter 4 – Analysis of Data

4.1 Introduction-

This chapter presents the data collected and analyzes it with regard to the study's purpose and research inventories. Quantitative statistical analysis techniques were used with the survey and student achievement data. The collected data were entered into Microsoft Excel and STATA software. The data were analyzed using central tendencies and multivariate regressions.

The purpose of this study was to determine if closure or brokerage within Professional Learning Communities (PLC) can influence the amount of innovation and improve student reading achievement as measured by DIBELS Next reading inventory. The overarching question for this research is: What is the effect of PLC social capital on student achievement?

1. Where does innovation outside of the PLC come from?
2. What is the catalyst of successful PLCs?
3. How does the interaction of the degree of closure (trust, information sharing & shared vision) and the degree of brokerage with professional networking on the outside foster a group's creativity, innovation, best practices and ability to increase student achievement?

4.2 - Description of Population and Sample

The participants in this study were public elementary school teachers. Teachers in this survey were collected from 26 suburban Kansas elementary schools from the same school district during the 2011-12 school year. As stated in Chapter 3, the selection of the district for this study was purposeful due to its convenience and location. However, the study and district student demographics mirror that of the state of Kansas as seen in Table 4.15. In spring of 2012 a questionnaire was sent out via email to Kindergarten through 6th grade teachers in 26 of the 35

elementary schools in the district. Survey results were collected included 502 respondents and 182 PLCs and contained more than 7,500 students nested within the PLCs. Study school sizes ranged from 240 to 650 students in grades K-6. Of the data collected from the 182 PLCs, it was decided to only use survey data from PLCs that had a 50% or better response rate. Data from 20 PLCs not being used for statistical analysis because less than 50% of members from a perspective PLC completed the survey, thus consisting of 162 PLCs. Table 4.1 lists the total number and percentage of teachers for each participating school, as well as the number of students' data nested within each PLC. Of the possible 502 teacher participants, 357 completed surveys. The average return rate on surveys was 71%, with the return rate at buildings ranging from a minimum of 22% to a maximum of 100%.

Teachers participating in this study were predominantly veteran teachers with 64.5% of the participants having taught more than 10 years and 82% of the teachers have taught for 5 or more years. 47% percent of these veteran teachers have taught in the district for more the 10 years and 70% of veteran teachers for more than 5 years. The teachers participating in this survey emulates the demographics of the teachers within the study district. Thus, this district possesses a large number of veteran teachers. According to the district's website, almost 80% of teachers in this school district have an education level of a Master's degree or higher. It is believed that all groups of teachers are equally represented in the study sampling.

4.3 Student population demographics in PLCs

The 7,502 student achievement and demographic data is nested within teacher classes and, of course, within PLCs. This data sample consists of 52% males and 48% females. 64% of the study population is white; the largest minority group is Hispanic, which accounts for 19% of the study population. The range of students per grade in this study is fairly equal, with a low of

13.0% (N=977) to a high of 15.8% (n=1188) of students from K-6th grade. Other student controls collected include student SES status, special education status, and identification as an English language learner (see table 4.3). 42% of students receives some sort of lunch support for their SES level; with 51% (n=3,786) attending a school that receive state and federal Title 1 funds. The schools labeled as Title I receive extra building personnel such as additional reading support (teacher or aides), a full-time social worker, and math instructional coach. 67% (n=5,040) of the students in this study attend a school that has school-wide positive behavior supports in place. 9% (n=666) of students have been identified and have an IEP; additionally, 2.5% have been identified as gifted and have an IEP for giftedness.

District Demographics

The district in this study has seen an increase in the number of students receiving lunch support (low SES) and increase in minorities over the past 15 years, as seen in table 4.4. In 1999 the district student population was quite a bit different than it is now. In 1999, the free and reduced student population was 7.8%; now 13 years later, it is 35.5%. This change has not been consistent district-wide. Some pockets of the district have schools with a free and reduced student population of over 80% and other schools still with less than 10%. Similarly, this district is continuing to evolve from a predominantly white school district, as it was in the 70's through the 90's, to a district that is becoming more diversified. Today, the student population is 66% white; in 1999, white students accounted for 89.2% of the student population as seen in table 4.5. Demographic evidence indicates this district is going through a considerable transformation in student population with sharp increases in the number of students on free and reduced lunch status (an increase of 455% since 1999). In the same time period, the number of non-white students increased by 308%; with the largest increase in minority being Hispanic. However, the

evolution in student demographics has not been consistent in all parts of the district. This is illustrated by the 2012 student demographics by high school attendance areas which include all students K-12 as illustrated in Table 4.6.

4.4 Review of Student Reading Achievement

The instrument being used to monitor growth in reading achievement, *DIBELS Next*, is given to all students in the fall, winter and spring of each year. Table 4.7 reviews the breakdown of *DIBELS Next* composite scores for each assessment window. *DIBELS Next* scores are broken down into three categories : benchmark, strategic and intensive; each one listed from least to most severe. In the fall, the number of students at their grade level composite score is 66.7% as indicated from table 4.7; the number at benchmark increases to 76.7% in the spring.

4.5 Review of Closure Survey Instrument

The survey measure for closure was based on Leana and Pil's (2005) five-point scale about the structural, relational, and cognitive aspects of internal ties. Responses of participants were asked if they strongly disagree, disagree, neutral, agree, or strongly agree for each statement. Survey statements ask participant to review structural aspect of their PLC to addresses openness, honesty, frequency, and willingness in information sharing. The relational aspect includes questions on trust, respect, integrity, team spirit, and confidence. The cognitive aspect focuses on shared vision, including similarity of views concerning the PLC's purpose and the degree of equal participation in goal-setting. The main foci of the closure survey are around shared vision, information exchange and trust. In this study, shared vision had the highest mean of the three variables, with a total shared mean of 4.52, compared to the means of 3.95 for information exchange and 4.00 for trust. However, two of the survey questions, #3 & #5, had a large standard deviation. These two questions were also removed from the statistical regression analysis as

indicated from factor analysis. Most of the questions regarding shared vision have a favorable outcome with 85% – 92% of respondents answering agree or strongly agree. However, the factor "teachers on my PLC have clear established norms" within shared vision had a lower mean of 4.31 with a standard deviation of 0.909. This may indicate a possible lack of trust in PLCs (see Table 4.9).

Table 4.10 summarizes the mean for information sharing, which was the lowest of the closure factors with a mean of 3.95 and a standard deviation of 0.940. The variables for information exchange were still high but not as favorable as the other values. Two factors stood out with 27.3% of PLCs indicating teachers were not able to share and accept constructive criticism within their PLCs without making it personal, as indicated by negative or neutral responses. For other factor, "teachers discuss and review student achievement data," 11.3% of PLCs indicated they were neutral, disagreed or strongly disagreed. The expectation for each elementary school in this district is that each principal reviews student data with PLCs once each semester to review student reading achievement scores. This topic will be explored more when later reviewing OLS models.

Table 4.11 shows a summary of trust, as illustrated with survey questions from information sharing, questions from trust variables indicate the potential for a lack of trust within PLCs. While many of the questions indicate there is a large amount of bonding within PLCs; there also seem to point to a weakness in how teachers communicate that can affect the process of collaboration around student achievement. Variables 1, 2 and 4 indicate some teachers have "hidden agendas" and do not always believe in open and honest communication with PLCs members. Additionally, question 4, the belief in the spirit of collaboration and the flow of ideas, has a standard deviation around 1.000 and only 84% of PLCs indicated they agree or strongly

agree. This would indicate such PLCs would struggle with what PLCs are designed to do – to collectively focus student learning targets. Accourding to DuFour, teams collaborating effectively on matters related to learning will hold each other accountable for the results needed to sustain continual improvement or to reach their established goals (2005). The collective commitments of PLC members will help all students raise their levels of achievement. Schools that do not display the trust and the ability to share information to initiate and sustain this work will not become more effective. Richard DuFour (2003) explains that when educators remain persistent and focused on improving the achievement for ALL students, the likelihood of sustained and substantive success is increased. For Professional learning communities to be effective they need to excel in four main priorities:

1. focus on learning,
2. focus on collaborative culture,
3. focus on results, and
4. provide timely, relevant information. (Eaker et al., 2002, p. 34)

Each priority contains several components that are essential for PLCs to increase student achievement. A key point to focus on is the mere presence of a PLC does not automatically equal positive results in student achievement. It is what the PLC chooses to focus on that will determine the outcomes. If PLC members feel there will be conflicts from the sharing of student data, as seen in information sharing question 2 and trust question 2, teachers will not fully open up during collaboration. Moreover, if PLC members do not believe in the spirit of collaboration or do not encourage new ideas the likelihood of innovation decreases.

4.6 Review of Brokerage Survey Instrument

Brokerage was measured on a seven-point scale based on the work of O'Toole (1997) and Meier and O'Toole (2003). Respondents were asked to rate the frequency of their interaction with 3 tiers of external actors—such as brokerage relationships within PLCs, within the school

level, district level or external educational institutions or professional affiliations outside of the school district. Scores on the original seven-point scale were converted to scores on a six-point scale, eliminating the "not applicable" option since brokerage variables were specifically chosen for the district and schools participating in this research. Participants' responses rated their frequency of collaboration from never, rarely, a few time per year, monthly, weekly, or daily collaboration. This instrument measures brokerage collaboration in three levels: Tier 1, Tier 2 and Tier 3. Each mean value for Tier 1, 2 & 3 are 3.95, 2.26 and 1.69 respectively.

A review of survey data of the three tiers of brokerage indicated, as no surprise that Tier I brokerage with PLC members was the most frequent used by PLC members reported as either daily (63%) or weekly (24.6%). The average collaboration with all Tier 1 external actors is reported as a few times per year to monthly. Table 4.12 summarizes Tier I collaboration; which is composed of sources that fall within each PLC's school building. Forms of collaboration outside of the PLC is "other teachers at my school but not at the same grade level", "Principal", "special education teacher", "math/reading specialist", "counselor/social worker" and "school psychologist". Survey results on collaboration within the school among teachers and the various individuals within the school on average took place on a monthly basis. Two areas, collaboration with school social worker and psychologist take place less frequently in a few times per year.

Tier 2 collaboration is reported as being less frequent as "a few times per year" and the frequency of Tier 3 collaboration is "never" or "rarely". As for Tier 2, the most frequent collaboration variable were "district curriculum specialist", "attendance at district professional development classes", "collaboration with district PBIS/MTSS/Autism-behavior specialists" and attendance at "teacher summer academy". Tier 3 collaboration was never or rarely used by a majority of PLC members. The most frequently used Tier 3 variable was collaboration with

"educators from other school districts", with 17% of respondents indicating such collaboration occurs monthly to daily. 6% of PLC respondents indicated the enrollment of weekly attendance to graduate level courses towards a degree program. However, 16.4% indicated they participated in graduate level course work a few times a year. One could assume that the 16.4% of teachers taking graduate courses a few times a year are taking credits for license renewal or horizontal movement on the salary schedule and not working towards a degree program.

4.7 Closure Factor Analysis –

Factor analysis of the survey items making up the measurement for closure was done using SPSS to reduce the large data set in to a smaller number of components. Closure was measured by Leana and Pil's (2005) five point scale about the structural, relational, and cognitive aspects of internal ties. Some of the language as altered from Leana and Pil's (2005) survey to adapt it to measure closure in PLCs in education operational terms. The survey instrument for closure was constructed to contain three factors – shared vision, information exchange and trust; with each construct consisting of 5 survey questions. It was observed that 11 of the 15 made correlations of at least medium sized (e.g., >.30), suggesting reasonable factorability. Second, the Kaiser-Meyer-Olkin Measure of Sampling adequacy had a value of 0.928; which is well above the commonly recommended value of 0.6 and Bartlett's test of sphericity was significant (X^2=2810.23, p>0.000). Factor analysis using principal axis factoring indicated there were three district factors; which is what was expected (see Total Variance Explained – Table 4.16 and Scree Plot Table 4.17). However, a total of five items were eliminated because they failed to meet criteria of having minimal cross-loading between variables. These items "teachers on teams have clear established norms", "teachers view themselves as a partner in accomplishing student achievement goals", "teachers are comfortable to discuss personal issues if they affect their job

responsibilities", "teachers have confidence in one another that they will do their part to help students succeed" and "teachers show a great deal of integrity". These factors are in italicized font in the review of closure survey questions. The pattern matrix showed there were three questions for shared vision (question 1, 2, & 4), two questions for information exchange (3 & 4) and five questions measuring trust (information exchange 1 & 2 and trust questions 1, 2 & 5).

4.8 OLS Analysis of Brokerage-Closure Models

Examinations of brokerage and closure effects on student achievement were conducted using STATA to perform a series of cross-sectional OLS models; each controlling for several variables as illustrated in table 4.18. The first model, the only specifies controls are for school-level fixed effects by creating school dummies in STATA, which would include all fixed aspects of a school's climate such as: physical facilities, PTA/community involvement, principal effectiveness and other factors that may affect the function of the school. These fixed effects accounts for about 6% of the variance in student reading achievement growth. More importantly, this OLS data for this model shows that none of the school level attributes are statistically significant. This model demonstrates that the school a student attends does not matter in regards to the student's achievement growth. All future models (except Model 4) will include controls for school fixed effects, but will not be reported, as one could view all of the schools in this study as one unit. Since the measurement of reading achievement is based on a growth measure, Model 2 demonstrates the amount of variance contributed from the Winter 2012 *DIBELS Next* composite score, or the baseline score, accounts for 28% of variance (28% variance is calculated by subtracting Model 2 R^2 value from Model 1 R^2 value). Model 3 combines school fixed effects, teacher-level controls, student-level controls and PLC-level controls. Model 3 controls

account for almost 39% of the variance in student reading growth. The first three models demonstrate which controls are meaningful.

Model 4 is a model that examines the extent to which the theoretically important constructs of this research, brokerage and closure subscales, and their effect on increasing student achievement. This model examines and accounts for over 8% of the variance in student achievement growth (R^2=.0808, F=2.30, p<0.050) in the absence of other controls. Within this model, the closure component of shared vision is shown to significantly increase student achievement by almost 15 units (p<0.050). Subsequent models are pertinent in understanding what the experimental variables of brokerage and closure do in relation to controls.

Model 5 is the first model to include the fundamental experimental variables with the control variables. Exploration of Model 5 divides brokerage and closure into their subscales of shared vision, information exchange, trust, Tier 1, Tier 2 and Tier 3. Results from Model 5 (R^2=0.463, F=0.002) accounts for over 46% of the variances in student achievement growth when brokerage and closure subscales are combined with the previous control variables of Model 3. These results also indicate that the brokerage and closure composites confound what factors help PLCs to effectively increase student achievement.

Model 5 results illustrate several of the brokerage and closure subscales are significant. OLS data indicates that closure subscales of shared vision (β=13.188, p<0.050) and information exchange (β= - 8.608, p<0.050) are significant, as well as Tier 1 brokerage patterns (β=10.209, p<0.050). While not significant, the subscales of trust has a negative value (β= - 0.245), as well does tier 3 brokerage (β= - 8.654) and tier 2 brokerage (β=5.772) does have a positive impact. Preliminary findings indicate that that amount of shared vision and tier 1 brokerage do have a significant effect in increasing student reading achievement growth. However, information

exchange does have a significant negative impact on student achievement; which is counter intuitive to what the PLC literature reports. The next section will expand more on these findings.

4.9 Discussion of Findings

Altogether, these OLS models make a strong case to support the null hypothesis that PLCs with higher amounts of brokerage and closure will increase student reading achievement. Study findings indicate that there is strong evidence to support this notion because PLCs having a strong shared vision and strong Tier I brokerage interaction demonstrated an increase student reading achievement by 23 units ($p<0.050$). The results from this study support current PLC literature, in that, PLC teams tend to be more effective when they share a common vision of their purpose, focused in their work and consist of members that believe in reaching student achievement goals through collaboration efforts. It is the alignment of these simple, but important philosophies, which enable to process that, expands their repertoire of skills, language, materials, and strategies to impact student learning (DuFour, 2005). As Schmoker points out, these qualities allow team members to tap into each other's existing capabilities and increase the social capital within the PLC (2006). Truly productive teams are ones in which teachers rigorously plan, design, research, evaluate, and prepare teaching materials together (DuFour, 2005). What will lead schools to continual improvements is when teachers are teaching and reflecting with one another the practice of teaching (Fullan, 2001). The focus of this study is to find out what factors make PLCs effective. Student achievement was found to be higher in PLCs that are tightly aligned communities marked by a common purpose and shared identity among staff. Leana and Pil, (2006) note that the unity of goals helps create a sense of shared responsibility and joint action. A collective vision reduces free-riding, indifference,

circumvention, and passive–aggressive actions, allowing more effective discussions on the means to achieve goals and on the criteria for evaluating outcomes (Portes, 1998).

However, what was uncovered with information exchange is a surprise and contradicts what PLC literature says about the frequency teachers review student data. One would suggest that the more teachers in PLCs exchange information the more student achievement should increase. Yet, in this data set, increased information exchange actually decreased student achievement. This is counter-intuitive Social Capital Theory and PLC literature. There are several potential reasons to describe why there is a negative effect. One suggestion is that the literature is wrong. However, the data set at this time is insufficient for a robust investigation of this concept because longitudinal data is lacking. Another possible explanation is more information exchange occurs in PLCs in which there are more struggling students. Another possibility could be a situation in which there is much information exchange; however, teachers may lack the expertise in knowing which interventions to put in place to improve a student's reading ability. This data set is not able to answer such a question and should be the focus of future research. More likely, survey data may point to foundational flaws in how PLCs in this study share and use student data. In Table 4.8, the mean for each of the factors for information sharing is summarized. Two variables for information exchange stood out: 27.3% of PLCs indicated teachers were not able to share and accept constructive criticism within their PLCs without making it personal as indicated by negative or neutral responses. The other factor, "teachers discuss and review student achievement data", 11.3% of PLCs indicated neutral, disagreed or strongly disagreed responses. Additionally, Table 4.9 may provide some evidence to why trust, although non-significant, showed negative growth in student achievement ($\beta = -0.245$). This table shows a similar trend, as seen with survey questions from information sharing; questions from trust variables indicate a

possible lack of trust within PLCs. While many of the questions indicate there is a large amount of closure within PLCs; there also seems to be a weakness in how teachers communicate that can affect the process of collaboration around student achievement. Variables 1and 2 indicate 16% of PLCs show some teachers have "hidden agendas" and 18% of PLCs "do not always believe in open and honest communication". Additionally, question 4, the belief in the spirit of collaboration and the flow of ideas, indicated only 84% of PLCs indicated they agree or strongly agree. This might suggest a correlation why such PLCs would struggle with what they are designed to do – to collectively focus student learning targets. Research by Bradach and Eccles (1989) indicated that trust is needed to improve information sharing and information facilitates the growth.

One of the barriers noted in PLC literature negatively affecting PLCs is the lack of trust, healthy conflict, and true collaboration. Without these three components, team relationships will be damaged (Wiseman, 2008). By merely placing people in groups will not cause each individual to work effectively together. More recent literature has indicated that areas in which PLCs fall short are the development of mutual trust, having procedures in place to address team disagreement and a developed sense of high-level questions into instructional practices (Hord, 1997). Research from 1990 and 2003, by Judith Little, indicates many teams discuss issues that do not deal directly with student learning, confirm present practice without evaluating its worth, and that non-interference, privacy and harmony still prevail at the expense of real continual learning through honest discourse.

It is how teachers, PLCs, and a school manage conflicts, whether they suppress or embrace their differences, may help define the ultimate potential for organizational learning and change. Lickona and Davidson claim, "Great schools row as one", they pull in the same direction in

unison. In contrast, Lickona and Davidson found that struggling schools were fractured, had distrust, and many staff members not working toward the same goals (2005).

A key point to focus on is the mere presence of a PLC does not automatically equal positive results in student achievement as illustrated by the negative effect of information exchange on student achievement from OLS results in this study ($\beta = -8.607$). What the PLC chooses to focus on will determine the outcomes. Research by Wiseman, indicated teachers will not fully open up during collaboration if PLC members feel there will be conflicts from the sharing of student data (2008), as seen in information sharing and trust. The negative results and review of survey responses may be an area for future research to investigate how conflict may affect how PLCs work.

However, the explanation provided in the section above, as to why increased information exchange has a negative effect on student achievement is not based on robust examination of data, but rather on inferences from the survey data and PLC literature. Future research should continue to investigate why.

Closure is likely to engender unity and efficiency in PLCs for developing approaches that stimulates and focus the team's energies in improving student success. Likewise, increases in brokerage may improve a PLCs capability to draw on the know-how, innovation, and implementation of new programs through the support of external actors to increase student reading achievement. In fact, OLS models show that Tier I brokerage is the life-line of effective PLCs and is shown to significantly increase student achievement ($\beta = 10.208$). This study suggests the source of true innovation and improvements in instructional methods come from collaboration with the actors within a school, but beyond the PLC group. These relationships consist of such as Teachers in school but at other grade levels, School administration, Special

Education Teacher, Reading/Math specialist, School Social Worker/Counselor, Professional Development offered at school or School psychologist. Thus, changes in instructional practices are more likely and more effective when teachers participate with others from their own school or grade. In fact, professional development is effective when it mirrors the expected teaching and learning outcomes that is expected in the classroom, is driven fundamentally by the needs of the participants and enables teachers to practice new skills in an atmosphere that is directly connected with teaching in the classroom (Elmore, 2002). Tier I brokerage provides opportunity for adults across a school system to learn and think together about how to improve their practice in ways that lead to improved student achievement. Within the same environment Tier II brokerage did show a positive effect on student achievement, but was not significant. With these external relationships, teachers accumulated a foundation of experiences, knowledge, skills, interests, and competence that have immediate relevance to their jobs. Adults, like students, need to see the results of their efforts and to get feedback about progress toward their personal development. This kind of collaboration in effective PLCs is rarely found in more traditional types of professional development or in common staff meeting time. These findings fall in line with recent research on effective professional development trends. Porter and colleagues (2000) found that teachers from the same program school participating together in professional development changed their thinking and acting more after the professional development, as compared to teachers who participated without other teachers from their workplace. In fact, one longitudinal study of K–12 professional development, using self-reports of change from 287 teachers, found "little change in overall teaching practice" after 3 years. The authors found that "teachers changed little in terms of the content they teach, the pedagogy they use to teach it, and their emphasis on performance goals for students," although some individual teachers did

sometimes show moderate change (Porter, Garet, Desimone, Yoon, & Birman, 2000). Tier I collaboration may help all members possess an expanded repertoire of skills, materials and strategies to impact student learning. By expanding and extending teacher social capital from one PLC to another, members can tap into each other's new and existing instructional methods, concepts, and expand the learning potential of their students.

4.10 Summary

In schools that have changing demographics, like the schools within this study, there is a need to continue to be innovative at meeting the increasing social, emotional and academic needs of their students through structured professional development and collaboration that is directed to the needs of their students. PLC literature says truly productive teams are those in which teachers rigorously plan, design, research, evaluate, and prepare teaching materials together (DuFour, 2005). Teachers teaching one another the practice of teaching is what will lead schools to continual improvements. Schools can close the achievement gap by using what they already know about instruction and by what they choose to do within PLCs. However, if school administrators use the information within this study, the pace and volume of student achievement may increase. Moreover, the Southwest Educational Development Laboratory (2000) suggest that closure human interactions are the most important aspect that make or break PLCs, such interactions include teacher attitudes towards schooling and students, collegial relationships among teachers and the willingness to share personal practice with colleagues. This research shows that increases in Tier I brokerage improves student achievement; which may be due to how PLCs draw on the know-how, creativity, and support of external actors in innovation and implementation and in other ways of supporting the students and colleagues. The internal ties of a group plays an important role in overcoming barriers to building an effective PLC, which

includes strong shared vision and commitment to increasing student achievement, a Protocol for dealing with conflict (Wiseman, 2008), and a manner in which to enable external Tier 1 actors to collaborate with PLCs.

Chapter 5 – SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine if teacher social capital within Professional Learning Communities (PLC) can increase innovation and student reading achievement as measured by *DIBELS Next* reading inventory.

The overarching question for this research is – What is the effect of PLC social capital on student achievement?

1. Where does innovation outside of the PLC come from?
2. Most importantly, for practitioners, what is the catalyst of successful PLCs?
3. How does the interaction of the degree of closure (trust, information sharing & shared vision) and the degree of brokerage with professional networking on the outside foster a group's creativity, innovation, best practices, and ability to increase student achievement?

Summary of Key Findings

Where does innovation outside of the PLC come from? This is a question that has been asked by many studies; however, this research not only answers this question, it also provides evidence that collaboration within the school actually increases student achievement more than collaboration with external sources. This becomes an important point with funding sources becoming potentially more restrictive in how and where school funding dollars are spent. Additionally, the demographics of many first-ring suburban school districts, such as the district in which this study took place, have seen dramatic changes over the past 15 years. Demographic evidence indicates this district is going through a significant transformation in student populations, with sharp increases in the number of students on free and reduced lunch status increasing 455% since 1999. In the same time period the number of non-white students increased

by 308%, with the largest increase in the Hispanic population. Understanding theses changes helps school administrators make better decisions concerning interventions and the effective use of funds to strategically support teacher development and improve student achievement.

The levels of differentiation have been classified as Tier I (within the school), Tier 2 (within the district but outside the school), and Tier III (outside the school and district). OLS shows statistically significant contributions to innovation into PLCs come from Tier1 sources. In fact, it could be said that Tier I brokerage is the life-line of PLCs for innovation, and results in a significant increase in student reading achievement growth. OLS results shows the larger the gains in student reading achievement in PLCs that have more frequent collaboration is with Tier I sources. This result says that collaboration with members within the school is more apt to change and/or alter instructional practices or provide more support than collaboration with sources outside of the school building. This finding has a large impact on how professional development efforts should be handled. Teachers within a building may be more likely to help colleagues with the implementation of instructional innovations, offer ongoing support, and illustrate how new ideas/ways to instruct students can improve student achievement. In light of these findings, school districts should review their professional development models to include Tier I collaboration. Some possible examples of Tier I supports may come as models as train-the-trainer models; should offer opportunities for teachers to pilot instructional/ curricular changes in buildings to provide local support to colleagues; and should review their meeting/collaboration models to include opportunities for colleagues from different PLCs to collaborate on professional development needs that arise.

The second question this study set out to answer is what is a catalyst for PLCs to be effective? PLC literature points to many necessary components (as noted in chapter 2) for PLCs

to be effective at reaching students' needs and to increase student achievement. This study tests these concepts as they apply to the importance of shared vision and its importance to the transfer of social capital between teachers in PLCs. The presence of a shared vision is the most important structural components to have within PLCs. In Chrispeels's (1990) report of effective schools, she stated, "If a school staff has a shared vision, there is a commitment to change." Therefore, if the members of a PLC, or school, concentrate their efforts to solve specific problems, such as improving teaching and learning, the possibilities of PLCs effectiveness will be greater. This may suggest that it is necessary for PLCs to have a shared educational language and goals set forth for them to provide criteria to guide their work. However, contrary to PLC literature, trust and information exchange were not significant factors needed for PLCs to increase student achievement. The models being tested in this study do not test or provide enough evidence to analyze if there is an additive effect if higher amounts of trust and shared vision increase the transfer social capital among PLC members. The analysis of longitudinal data may provide more robust examination of this question.

This study does provide evidence that the degree of closure and brokerage fosters a PLCs ability to increase student achievement. The true question of all practitioners is: does practice X increase student achievement? When it comes down to it, very few things directly translate to a significant improvement in student reading scores. OLS findings did show an increase in student reading achievement in PLCs that had higher amounts of shared vision and Tier I brokerage. However, contrary to theory and intuition, PLCs with an increase in information sharing actually demonstrated a significant decrease in student reading achievement growth. This is information that should be further investigated in future research studies.

Recommendations for Action

Following a comprehensive survey of the literature and analysis of survey data, the researcher suggests the following practical actions to support and increase the transfer of social capital through the concept of PLCs.

The first recommendation is to promote a strong shared vision and collectively used instructional language to ensure teachers have the same goals and ambitions for reading student achievement goals. DuFour (2005) says the use of a common language and the formation of norms plays a significant role in creating the foundation of a culture of collaboration that help PLC teams make commitments to one another. The creation of relationship building through the use of a common language and values creates pathways for knowledge synthesis and sharing.

A second recommendation from this research suggests that teachers *within* a building may be more likely to help colleagues with the implementation of instructional innovations, to offer ongoing support, and to illustrate how new ideas/ways to instruct students can improve student achievement. With these findings it is recommended that school districts review their professional development models to include opportunities to promote Tier I collaboration opportunities to provide local support to colleagues; and to review their meeting/collaboration models to include opportunities for colleagues from different PLCs to collaborate on professional development needs that arise. By their very nature, PLCs spend much of their focus on providing re-teaching efforts. Especially with reading, many times teachers struggle to independently find interventions that fit student needs or teachers may use interventions that are not the right fit for the academic need. This research suggests collaboration among colleagues within the school is more likely to change and/or alter instructional practices or provide more support than sources that are outside of the school building.

Limitations

Due to time constraints, this study has by nature some limitations. Data used in this study is limited to a cross-sectional analysis of the 2011-2012 academic school year. This cross–sectional study not does not allow for the differentiation of the direct components from indirect ones, that is, this study does not allow the analysis of which sub-scales of brokerage and closure are most effective in building and transferring social capital in PLCs. Longitudinal data will further control and eliminate inherent limitations and provide further examination of the lagged effects of social capital in Professional Learning Communities on student achievement. This would require extensive longitudinal data on a variety of other actors and mechanisms. PLC and student data collection that is ongoing would further investigate and clarify the findings in this study and provide a more thorough and robust examination of the proposed theoretical constructs. Traditional educational attainment controls that include number of parents in household, parents' educational attainment levels, and parent support of educational goals are missing. This could account for more of the variance in student achievement growth.

The survey designed by Meier and O'Toole (2003) measures the frequency of brokerage interactions and does not contain a quality control feature to measure the quality and effectiveness of brokerage subscales. The addition of such a component may provide some insight on more effective means of brokerage interactions that may be limited to time. One example: a high-quality staff development that may only be available a few times per year. The value of such professional development may not show its effectiveness because the frequency is less than that of a less effective brokerage sub-scale that is employed more frequently.

Suggestions for Further Research

Further research should continue and go beyond the research in this study to expand the knowledge of how social capital works over time and how it is developed and transferred from one teacher to another such research could use both quantitative and qualitative designs that broadly investigate the effect of PLCs on teacher development and student achievement growth.

The following kinds of studies should be considered:

- Longitudinal survey data collection efforts that continue the investigations of this study would look at OLS analysis on the longitudinal data and lagging effects of closure and brokerage development within PLCs. Such studies could provide a more robust examination of PLC effectiveness if student data includes traditional household controls such as number of parents in household, parents' educational attainment and type of household to account for more variance in student achievement.
- Future research expanding this study could breakdown which closure factors are most important for PLCs to function in the most efficient and collaborative manner.
- A similar study should be conducted at the middle or high school levels.
- Research that would examine in-depth case studies of levels of brokerage sources (Tier I, Tier II and Tier III) to determine which external actors and how the quality of those interactions help transfer social capital into PLCs and classrooms to result in student achievement growth.
- In-depth case studies of changes in student learning for sample students in PLCs that have high amounts of brokerage and closure to further understand how the teacher collaboration in these PLCs increases student achievement. For example, teachers

working in PLCs, observational studies (both quantitative and qualitative) that document changes in teaching practice as teachers work in PLCs.

- Further investigation is needed to provide investigation on why the OLS results demonstrated a decrease in student achievement when PLCs reportedly shared information more frequently. This result is counter-intuitive to what current educational literature says about information exchange.
- A similar study should be performed using another tool that measures and investigates how the internal relationships of PLCs members affect information exchange. One such inventory that could be implemented is Harvey and Drolet's 17-item "Survey of Team Characteristics" which takes into consideration the quality of collaboration and group efficacy.
- Future research should explore if the interaction of brokerage and closure is a non-linear effect; looking at second and third order effects.

Concluding Remarks

In closing, the ambitions of many schools over the past decade have been to build effective professional learning communities in schools. However, little in the educational literature has provided statistical evidence that PLCs actually work to increase student achievement. This study provides evidence that PLCs do increase student achievement when there is a strong shared vision in place. This study also provides evidence that Tier I brokerage directly improves student achievement. If the ambition of school leaders is to create collaborative-rich PLCs, then leaders must focus their efforts on creating the conditions that are

needed as indicated in this study: strong shared vision and designing opportunities for PLCs to transfer social capital.

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Appendices of

Forms and Communication

Appendix 1:

Date: March , 2012

Dear (Principal's name):

My name is David Conrady and I am a fellow administrator attending the doctoral program at the University of Kansas. My dissertation study is an exploration of Professional Learning Communities and grade level/MTSS teams within these communities, what makes them effective and how they affect student achievement.

I am requesting your participation in my research. The office of the Associate Superintendent for Educational Services for the Shawnee Mission School District and the Department of Educational Leadership and Policy Studies at the University of Kansas has approved this study. The study is an important one that will help to identify any necessary staff development opportunities for teachers. I truly understand that your time is scarce with the charge of leading you school. Yet, your input is invaluable in helping improve student success within your school.

Your participation includes only two simple steps:

1. You agree to allow your school and teachers to participate in this study.
2. Provide time during a staff meeting or contract time for your teaching staff to complete the survey via a survey monkey link.

Upon your approval, I will be contacting your staff in a few days with more detailed instructions in an email to the survey monkey link for the teaching staff to complete. This survey will take 5-10 minutes. When the survey monkey link is emailed to teaching staff,

I want to make certain that the time completing the survey is useful for you and your staff. Therefore, I will send you a copy of your school's analyzed data upon request. This data can serve a variety of functions in the building of effective teams throughout your school.

Please note that any information that is obtained in connection with this study and that can be identified with you, your staff, or school will remain confidential. All data will be kept secure, visible to myself and university advisor.

Thank you for your time and if you have any questions, please feel free to call me on my cell at 913-530-8376, school extension or email at dconrady@ku.edu.

Respectfully,

David Conrady

Appendix II – Participation Notification Emails

March 2012

Dear Shawnee Mission Educator,

A few days from now you will receive an email request to fill out a brief electronic survey for an important research project conducted within the Shawnee Mission School District.

This research project will explore the internal and external relationships within grade level teams, MTSS teams, or Professional Learning Communities. I am conducting this study to better understand how the professional relationships of teachers in grade-level teams affect student achievement. This will entail the participation in an online survey that is expected to take approximately 5-10 minutes to complete. Your honest feedback will provide information to better understand how to support grade-level teams and your responses will be confidential.

The office of the Associate Superintendent for Educational Services for the Shawnee Mission School District and the Department of Educational Leadership and Policy Studies at the University of Kansas has approved this study. I am writing to you in advance so that you will know ahead of time that you will be contacted to complete the survey. The study is an important one that will help to identify any necessary staff development opportunities for teachers.

Thank you for your time and consideration. It is only with the generous help of educators like you that this research project can be successful.

Sincerely,

David Conrady, Principal Investigator
Doctoral Student – University of Kansas
Telephone 913-530-8376
Email: dconrady@ku.edu

Appendix 3 – HSCL Approval Form

Approved by the Human Subjects Committee University of Kansas, Lawrence Campus (HSCL). Approval expires one year from 2/13/2012. HSCL #19855

Internet Information Statement

The Department of Educational Leadership and Policy Studies at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

I am conducting this study to better understand how the professional relationships of teachers in grade-level teams affect student achievement. This will entail the participation in an online survey that is expected to take approximately 10 minutes to complete. Your honest feedback will provide information to better understand how to support grade-level teams.

Your participation in this survey is strictly voluntary and your responses will be confidential. The survey questions are not designed to collect any personal or private information. Any information obtained during this survey, which could identify you, will be kept strictly confidential. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.

If you would like additional information concerning this study before or after it is completed, please feel free to contact me by phone or mail using the information below. My major professor Argun Saatcioglu can be reached at argun@ku.edu .

Completion of the survey indicates your willingness to participate in this project and that you are at least age eighteen. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429, write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, or email irb@ku.edu.

Sincerely,

David Conrady

Principal Investigator

10549 Bluejacket

Overland Park, KS 66204

(913) 530-8376

conrady@ku.edu

Appendix IV – Brokerage and Closure Social Capital Survey

Closure and Brokerage in Grade Level Teams

Copy of page:

The Department of Educational Leadership and Policy Studies at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

I am conducting this study to better understand how the professional relationships of teachers in grade-level teams affect student achievement. This will entail the participation in an online survey that is expected to take approximately 10 minutes to complete. Your honest feedback will provide information to better understand how to support grade-level teams.

Your participation in this survey is strictly voluntary and your responses will be confidential. The survey questions are not designed to collect any personal or private information. Any information obtained during this survey, which could identify you, will be kept strictly confidential. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.

If you would like additional information concerning this study before or after it is completed, please feel free to contact me by phone or mail using the information below. My major professor Argun Saatcioglu can be reached at argun@ku.edu . Completion of the survey indicates your willingness to participate in this project and that you are at least age eighteen. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429, write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, or email irb@ku.edu.

Sincerely,

David Conrady
Principal Investigator
10549 Bluejacket
Overland Park, KS 66204
(913) 530-8376
conrady@ku.edu

***1. Please indicate which grade level you currently teach.**

- ◯ K
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6

Page 1

Closure and Brokerage in Grade Level Teams

***2. How many years have you taught? (include all schools)**

- ◯ 0-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ 20 years or more

***3. How many years have you taught in your current district?**

- ◯ 0-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ 20 years or more

***4. How many years have you taught at your current school?**

- ◯ 0-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ 20 years or more

***5. How many years have you taught at your current grade level?**

- ◯ 0-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ 20 years or more

Closure and Brokerage in Grade Level Teams

***6. How many years has the current grade level teachers taught together?**

- ◯ 0-1 years
- ◯ 2-4 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ over 15 years

***1. Please indicate the extent that you agree or disagree with each of the statements about your grade level team. Choose your response from Strongly Agree to Strongly Disagree.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Teachers on my grade level team share the same ambitions and visions for student learning.	◯	◯	◯	◯	◯
Teachers on my grade level team share a common view of the schools purpose in educating students.	◯	◯	◯	◯	◯
Teachers on my grade level team have clear established norms (how we behave when we meet to talk about data reviews, student inteventions, etc.).	◯	◯	◯	◯	◯
Teachers on my grade level team are committed to reach the student achievement goals of your team.	◯	◯	◯	◯	◯
Teachers on my grade level team view themselves as a partner in accomplishing the student achievement goals.	◯	◯	◯	◯	◯

Closure and Brokerage in Grade Level Teams

2. This section pertains to how well information is exchanged within your grade level team. Please indicate the extent to which you agree or disagree with each statement.

	strongly agree	agree	neutral	disagree	strongly disagree
Teachers on my grade level team engage in open and honest communication with one another.	○	○	○	○	○
Teachers on my grade level team DO NOT have "hidden agendas" or issues.	○	○	○	○	○
Teachers on my grade level team discuss and review student achievement data at each meeting.	○	○	○	○	○
Teachers on my grade level team share and accept constructive criticism without making it personal.	○	○	○	○	○
Teachers on my grade level team are comfortable to discuss personal issues if they affect their job responsibilities.	○	○	○	○	○

3. This section pertains to how well members within your grade level team trust one another. Please indicate the extent to which you agree or disagree with each statement.

	strongly agree	agree	neutral	disagree	strongly disagree
Teachers on my grade level team can rely on each other in difficult situations.	○	○	○	○	○
Teachers on my grade level team believe in the spirit of collaboration where the flow of ideas is encouraged.	○	○	○	○	○
Teachers on my grade level team have confidence in one another that they will do their part to help student succeed.	○	○	○	○	○
Teachers on my grade level team show a great deal of integrity.	○	○	○	○	○
Teachers on my grade level team have a professiona relationship built on trust and respect.	○	○	○	○	○

Closure and Brokerage in Grade Level Teams

Please indicate how often you speak with or collaborate with the following groups regarding educational interventions, improvements, or innovations. There are three levels you will be ask to choose from: within your school, within the district and outside of the district. Choose the answer that best describes your current practices.

1. Please indicate how often you speak with or collaborate with the following individuals within your building regarding educational interventions, improvements, or innovations. Choose the answer that best describes your current practices.

	Never	Rarely	A few times per year	Monthly	Weekly	Daily	Does not apply
Teachers at my grade level	◯	◯	◯	◯	◯	◯	◯
Teachers at my school, BUT NOT at my grade level	◯	◯	◯	◯	◯	◯	◯
Principal / Asst. Principal / Teacher on Assignment (TOA)	◯	◯	◯	◯	◯	◯	◯
Special Education teacher (Speech or Learning Center)	◯	◯	◯	◯	◯	◯	◯
Reading/Math Specialist	◯	◯	◯	◯	◯	◯	◯
School counselor / social worker	◯	◯	◯	◯	◯	◯	◯
Professional development offered at your school	◯	◯	◯	◯	◯	◯	◯
School Psychologists	◯	◯	◯	◯	◯	◯	◯

Closure and Brokerage in Grade Level Teams

2. Please indicate how often you speak with or collaborate with the following groups within the district regarding educational interventions, improvements, or innovations. Choose the answer that best describes your current practices.

	Never	Rarely	A few times per year	Monthly	Weekly	Daily	Does not apply
District curriculum & instruction subject area specialists (Indian Creek reading, math, science, etc.staff)	○	○	○	○	○	○	○
Teacher mentor	○	○	○	○	○	○	○
District trainers (technology)	○	○	○	○	○	○	○
District Office of Research and Assessment	○	○	○	○	○	○	○
District staff professional development classes	○	○	○	○	○	○	○
District specialists (PBS, MTSS, Behavior/Autism specialists)	○	○	○	○	○	○	○
Curriculum council or district committees or instructional cadre	○	○	○	○	○	○	○
Collaboration with other teachers in book study	○	○	○	○	○	○	○
District-wide professional development (summer academy, pre-service, etc.)	○	○	○	○	○	○	○
Collaboration with teachers from other buildings	○	○	○	○	○	○	○

Closure and Brokerage in Grade Level Teams

3. Please indicate how often you speak with or collaborate with the following groups or resources that are outside of the district regarding educational interventions, improvements, or innovations. Choose the answer that best describes your current practices.

	Never	Rarely	A few times per year	Monthly	Weekly	Daily	Does not apply
Educators from other school districts	◯	◯	◯	◯	◯	◯	◯
Graduate level Academic classes at accredited college/university	◯	◯	◯	◯	◯	◯	◯
Member of professional/educational organizations (ASCD, NSDC, etc.)	◯	◯	◯	◯	◯	◯	◯
Participation in action research	◯	◯	◯	◯	◯	◯	◯
Partnership with state agency	◯	◯	◯	◯	◯	◯	◯

Closure and Brokerage in Grade Level Teams

1. Please indicate the extent you agree or disagree with each of the statements below.

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Grade level collaboration is useful for my grade level.	◯	◯	◯	◯	◯
Grave level collaboration is useful for the teachers at my school.	◯	◯	◯	◯	◯
Grade level collaboration is useful for the students at my school.	◯	◯	◯	◯	◯
The teachers in this school have faith in the integrity of the principal.	◯	◯	◯	◯	◯
Support for grade level collaboration is supported by the principal.	◯	◯	◯	◯	◯
Support for grade level collaboration is supported by the district.	◯	◯	◯	◯	◯
In this school, teachers are continually learning and seeking new ideas.	◯	◯	◯	◯	◯
Grade level collaboration is supported by fellow teachers at my school.	◯	◯	◯	◯	◯
The members of my current grade level team need help dealing with conflict.	◯	◯	◯	◯	◯

Closure and Brokerage in Grade Level Teams

1. Circle the choice that best describes your current practices.

	If YES, how often?	If No, is this a practice you would like to do?
Do teachers in your grade level share students during intervention (workshop) time?		
Do teachers in your grade level assign students to ability level groups during intervention (workshop) time?		
Do teachers establish SMART (measurable and attainable) student achievement goals?		
Do teachers at your grade level review student data together (DIBELS, MAP, TEN, MBSP, etc.)?		

Thank you for you time and consideration in completing this survey. It is only with the generous help of educators like yourself that this research can be successful.

Appendices of Tables

Table 3.2 - List of Measures

Variable	What	When	Why	How
Brokerage questionnaire	Brokerage will be measured by a seven-point scale based on the work of O'Toole (1997) and Meier and O'Toole (2003).	April 2012	To gather brokerage data from each PLC member	Surveys will be sent to respondents using survey monkey using a coding system.
Closure Questionnaire	Closure will be measured by Leana and Pil's (2005) five point scale about the structural, relational, and cognitive aspects of internal ties.	April 2012	To gather closure data from each PLC member	Surveys will be sent to respondents using survey monkey using a coding system.
PLC student Rosters	2011-12 Class lists	December 2011 & Jan 2012	To assign students to PLCs to track student achievement in each PLC	Meet with each school principal to review class lists
Student Achievement	DIBELS Next Fall 2011, winter & spring 2012 scores	Fall 2011, January 2012, May of 2012.	This student achievement data will be gathered at the time of and prior to the closure-brokerage survey	Scores for students assigned to each PLC will be gathered from SMSD Assessment Director
School Level controls	School's student free and reduced lunch rates & racial diversity of each school.	Sept 2011 & January 2012	This information will be used as student & environmental controls	Data will be gathered from SMSD Assessment Director
Teacher/PLC Level Controls	Teaching experience, educational attainment, years in district, years teaching at current school, years teaching current grade level, years in current PLC	April 2012	This information will be used as teacher/PLC level controls	Surveys will be sent to respondents using survey monkey using a coding system

Table 4.1 - School participation in completion of surveys

School ID	# of sections (gr. K-6)	PLCs in study school	# of Students	# of teachers completing survey	% of teachers that completed the survey	# of PLCs included in study	Students nested in study PLCs	% of school population nested in Study PLCs
105	14	7	282	6	43%	4	117	41%
106	21	7	434	19	90%	7	392	90%
111	23	7	523	16	70%	7	346	66%
112	25	7	493	20	80%	7	434	88%
114	16	7	358	14	88%	7	287	80%
116	18	7	383	12	67%	7	213	56%
117	16	7	270	13	81%	7	256	95%
120	21	7	496	20	95%	7	445	90%
121	19	7	387	11	58%	7	230	59%
126	19	7	396	18	95%	7	349	88%
127	15	7	316	15	100%	7	316	100%
128	21	7	450	11	52%	7	240	53%
135	14	7	255	11	79%	7	200	78%
137	17	7	409	6	35%	5	107	26%
142	25	7	572	20	80%	7	454	79%
143	28	7	625	18	64%	7	397	64%
145	17	7	346	5	29%	3	105	30%
146	19	7	374	15	79%	7	322	86%
148	24	7	551	23	96%	7	512	93%
149	27	7	634	6	22%	4	146	23%
151	22	7	500	10	45%	5	223	45%
153	21	7	459	15	71%	7	357	78%
154	17	7	386	15	88%	7	341	88%
155	22	7	407	22	100%	7	407	100%
157	21	7	415	16	76%	7	306	74%
Totals	**502**	**182**	**10,721**	**357**	**71%**	**162**	**7502**	**70%**

Table 4.15 – Comparison of Student Demographics

	Study schools	Study School District	State of Kansas
White students	64.0%	67.0%	67.9%
Hispanic students	19.0%	16.0%	17.1%
Black Students	7.8%	8.6%	7.3%
English Language Learners	13.9%	10.2%	10.2%
Students on lunch support	43%	35.5%	49.0%
Students with Disabilities	19.0%	9.6%	13.7%

Table 4.2 - Experience of Teachers (values in percent)

Years	Years Taught	Years in current district	Years at current school	Taught current Grade	Years taught together
0-2 years	4.7	8.7	15.8	21.3	24.5
3-5 years	13.3	21.4	25.5	26.8	29.0
6-10 years	17.5	22.6	25.4	25.3	28.0
11-15 years	17.4	15.4	11.7	10.0	9.2
16-20 years	13.6	9.0	7.8	6.4	3.5
> 20 years	33.5	22.9	13.8	10.2	5.8

Table 4.3 – Special School and Student Factors (N=7502)

PBIS School	Attend Title School	Lunch Support Status	Special Education Support	English Language Learners
Not PBIS 2,462	Not Title 3,716	Not Free/Red 4,286	Not Disabled 4,575	Not ELL 6,456
PBIS School 5,040	Title School 3,786	Reduced 2,551	Disabled 1,430	ELL 1,046
		Free Lunch 665	Gifted IEP 691	

Table 4.4 – Change in student receiving lunch support

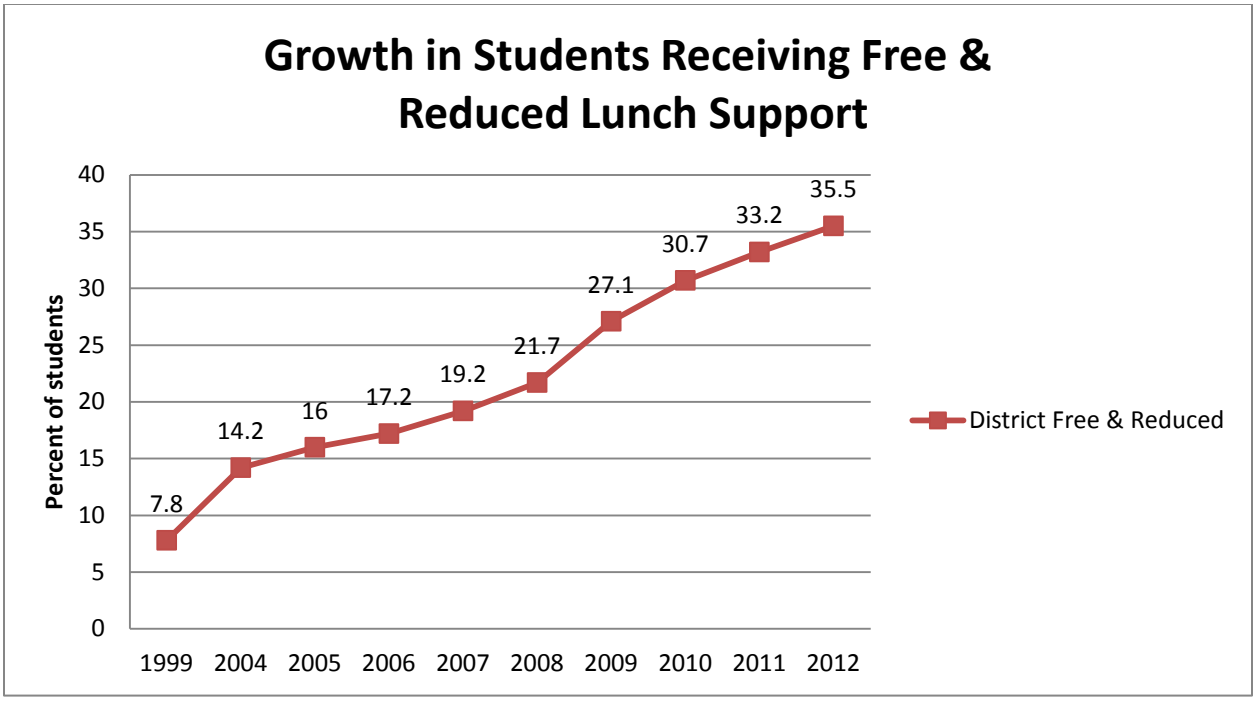

Table 4.5- Change in District student demographics

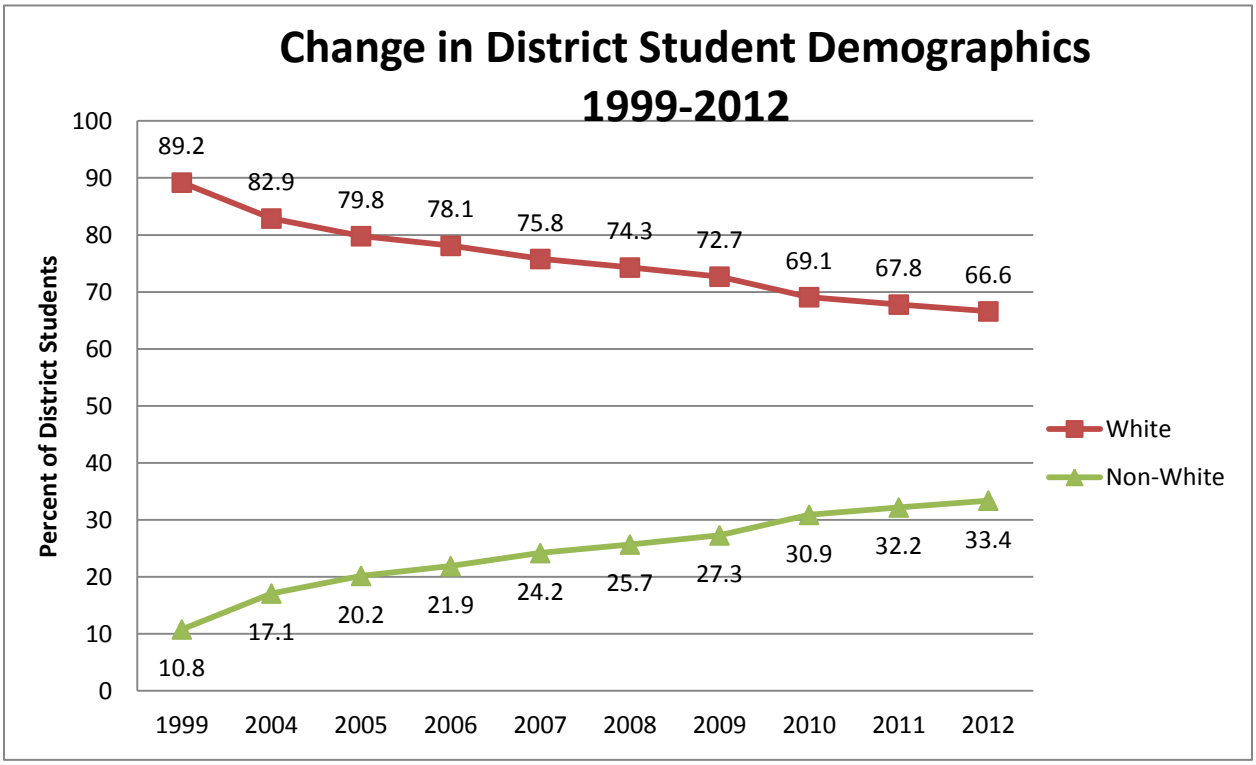

Table 4.6 – 2011-2012 Student Demographics per High School Attendance Areas

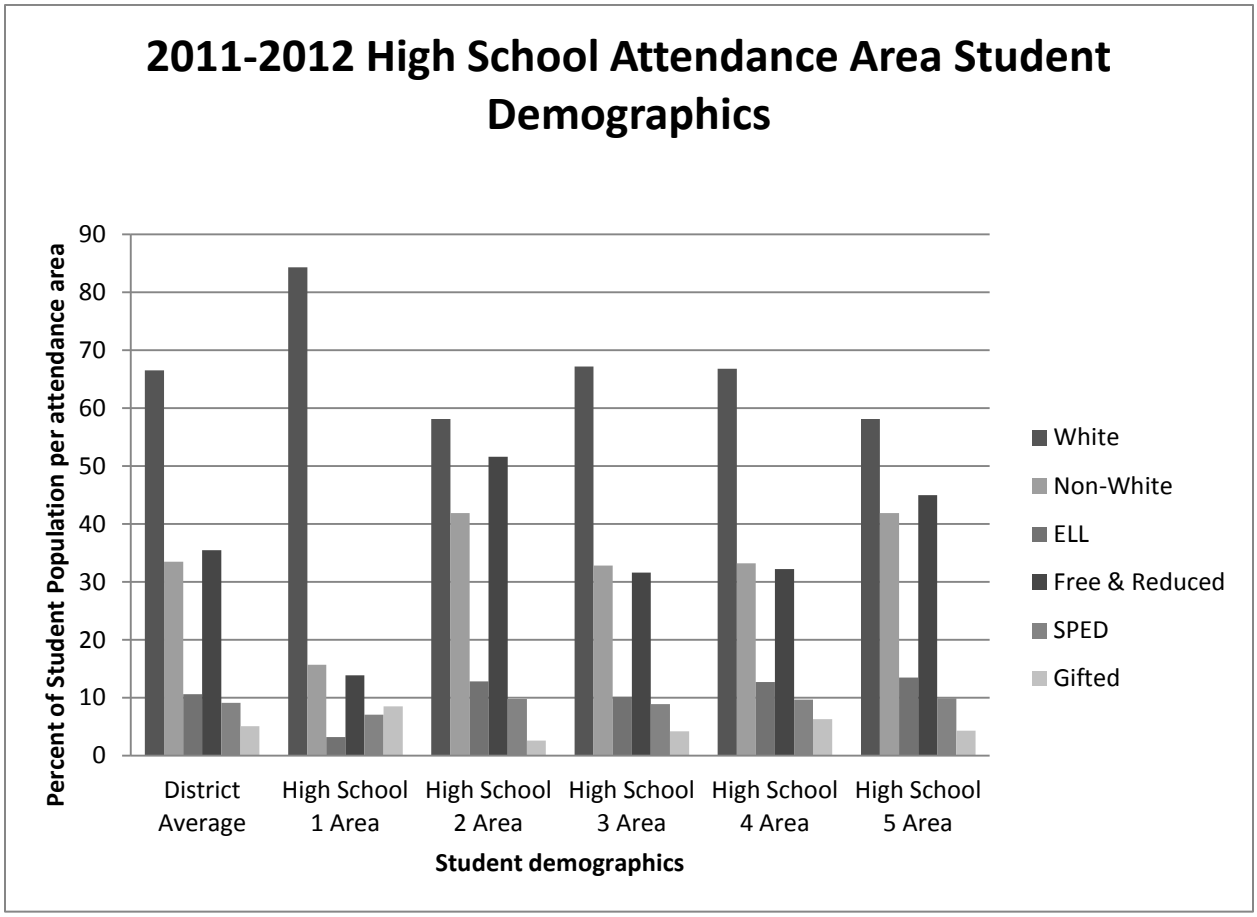

Table 4.7 – Summary of DIBELS Next Composite Scores for Fall, Winter & Spring 2012

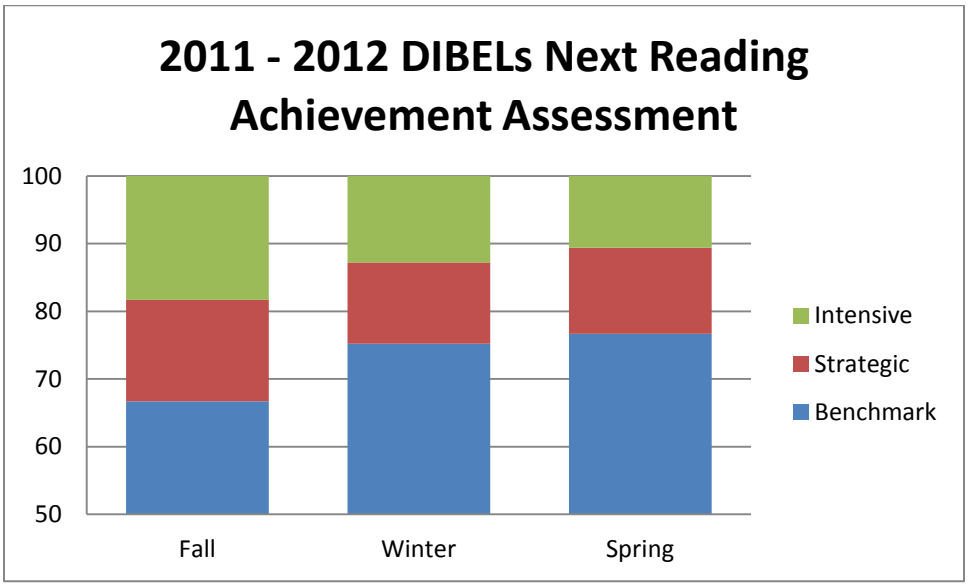

Table 4.8 Student achievement by school ID

School ID	Mean Composite Growth	Mean DORF Growth	Mean DAZEa Growth	Mean Retell Growth
105	92.4	32.7	11.7	11.0
106	78.5	22.0	10.6	1.3
111	98.2	33.2	9.9	15.9
112	73.9	26.8	7.4	8.9
114	86.9	29.3	11.6	5.9
116	87.9	28.9	9.8	9.4
117	85.4	29.7	9.7	9.3
120	81.2	25.4	11.5	11.0
121	77.4	25.7	8.3	11.5
126	92.2	26.7	11.6	15.3
127	90.7	24.3	10.7	18.0
128	70.0	28.1	10.3	3.27
135	98.8	23.2	9.7	14.9
137	61.6	27.3	5.0	11.8
142	82.3	24.7	12.1	11.0
143	77.8	25.7	7.7	11.6
145	56.7	23.0	6.4	9.8
146	81.1	28.3	10.0	8.9
148	83.3	27.5	10.4	12.5
149	113.8	28.3	9.9	17.5
151	95.6	27.0	11.6	15.9
153	90.1	27.8	10.2	11.5
154	81.9	25.3	10.6	10.9
155	93.7	37.9	11.2	12.4
157	82.0	23.9	10.4	14.0
Mean	**84.7**	**27.0**	**10.2**	**11.2**

Table 4.9 – Summary of Shared Vision

Variable	Mean	S.D.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Teachers on my grade level team share the same ambitions and visions for student learning.	4.45	.826	0.3%	5.2%	4.3%	29.4%	60.8%
2. Teachers on my grade level team share a common view of the school's purpose in educating students	4.53	.722	.5%	2.4%	3.5%	30.5%	63.2%
3. Teachers on my grade level team have clear established norms. ++	*4.31*	*.909*	*1.0%*	*5.4%*	*8.2%*	*32.2%*	*53.1%*
4. Teachers on my grade level are committed to reach the student achievement goals of your team.	4.57	.755	0.2%	3.4%	5.0%	21.7%	70.0%
5. Teachers on my grade level team view themselves as a partner in accomplishing the student achievement goals. ++	*4.43*	*.912*	*1.4%*	*5.6%*	*6.9%*	*23.1%*	*64.0%*
Total Shared Vision items #1,2 &4 included in mean	4.54	.695					

++ Survey questions were removed from analysis based factor analysis cross loading

Table 4.10 – Summary of Information Sharing

Variable	Mean	S.D.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Teachers on my grade level discuss and review student achievement data at each meeting.	3.93	1.03	2.4%	8.7%	16.5%	37.7%	34.5%
2. Teachers on my grade level share and accept constructive criticism without making it personal	3.95	1.07	2.4%	10.2%	14.7%	34.7%	38.0%
3. Teachers on my grade level team are comfortable to discuss personal issues if they affect their job responsibilities. ++	4.33	.917	1.2%	5.7%	6.5%	31.4%	55.2%
Total Information Exchange	3.93	.940					

++ Survey questions were removed from analysis based factor analysis cross loading
 # - Information sharing questions 4 and 5 are included in the trust scales based on factor analysis of the variables.

Table 4.11 – Summary of Trust

Variable	Mean	S.D.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Teachers on my grade level team engage in open and honest communication with one another	4.31	.958	2.0%	4.9%	8.6%	28.3%	56.2%
2. Teachers on my grade level team do not have "hidden agendas" or issues.	4.27	1.03	1.9%	7.8%	8.6%	24.7%	57.2%
3. Teachers on my grade level team can rely on each other in difficult situations.	4.60	.740	0.3%	3.8%	2.3%	23.3%	70.3%
4. Teachers on my grade level team believe in the spirit of collaboration where the flow of ideas is encouraged.	4.34	.957	1.7%	5.4%	8.1%	25.9%	59.0%
5. *Teachers on my grade level team have confidence in one another that they will do their part to help students succeed.* #	4.50	.814	0.8%	3.3%	6.2%	24.8%	65.0%
6. Teachers on my grade level team show a great deal of integrity.#	4.49	.829	0.6%	3.6%	7.4%	22.3%	66.0%
7. Teachers on my grade level team have a professional relationship built on trust and respect.	4.43	.892	0.8%	4.3%	9.8%	20.9%	64.2%
Total Trust	4.00	.789					
Total Closure	4.14	.725					

 # - Information sharing questions 4 and 5 are included in the trust scales based on factor analysis of the variables.

Table 4.12 Tier I Brokerage – Frequency of collaboration with sources inside the same school.

Variable	Mean	S.D.	Never	Rarely	Few times/ Year	Monthly	Weekly	Daily
1. Teachers at my grade level (PLC)	5.40	.991	0.5%	2.0%	5.0%	4.7%	24.6%	63.2%
2. Teachers at my school, but not at my grade level	4.37	1.21	2.2%	5.3%	16.3%	21.5%	40.0%	15.0%
3. Principal/Asst. Principal	4.07	1.18	2.0%	9.2%	17.7%	30.0%	32.8%	8.6%
4. Special education teacher	4.16	1.44	5.3%	11.6%	13.4%	18.5%	34.0%	17.3%
5. Reading/Math specialist	4.38	1.13	2.9%	3.8%	11.9%	27.7%	41.4%	12.4%
6. School counselor/ social worker	3.56	1.37	8.1%	17.1%	22.0%	20.3%	28.5%	4.2%
7. Professional development offered at school	3.19	1.03	7.4%	11.5%	46.8%	24.0%	9.5%	0.0%
8. School Psychologist	2.41	1.02	20.3%	34.6%	31.0%	11.8%	2.6%	0.0%
Average Tier I Brokerage	3.95	.694						

Table 4.13 Tier II Brokerage – Frequency of collaboration with sources outside the same school, but within the school district.

Variable	Mean	S.D.	Never	Rarely	Few times/ Year	Monthly	Weekly	Daily
1. District curriculum or instructional specialist.	2.69	.840	8.3%	29.1%	49.4%	11.7%	1.6%	0.0%
2. Currently a mentor or have a mentor assigned to you	2.04	1.59	59.1%	15.3%	7.1%	5.9%	5.5%	7.2%
3. District technology trainer	2.22	.801	19.6%	41.3%	36.0%	2.8%	0.3%	0.0%
4. District office of research & assessment	1.61	.721	51.9%	35.1%	12.5%	0.6%	0.0%	0.0%
5. District staff professional development classes	2.67	.707	6.7%	26.0%	61.2%	4.6%	0.9%	0.0%
6. District Specialists (MTSS, Behavioral, Autism, PBIS)	2.59	1.11	18.3%	28.9%	33.9%	13.3%	5.1%	0.6%
7. Participate with Curriculum council or instructional cadre	2.23	.995	27.9%	32.6%	27.5%	11.8%	0.3%	0.0%
8. Collaboration with other teachers in book study	1.62	.937	60.6%	24.3%	8.2%	5.8%	1.1%	0.0%
9. District-wide PD (summer academy, pre-service)	2.53	.748	12.3%	25.0%	59.4%	3.3%	0.0%	0.0%
10. Collaboration with teachers from other buildings	2.25	.861	18.0%	46.5%	28.7%	5.5%	1.4%	0.0%
Tier II average	2.26	.520						

Table 4.14 Tier III Brokerage – Frequency of collaboration with sources outside of the school district.

Variable	Mean	S.D.	Never	Rarely	Few times/ Year	Monthly	Weekly	Daily
1. Educators from other school districts.	2.35	1.18	25.8%	37.0%	20.2%	10.1%	6.5%	0.5%
2. Graduate level academic classes at accredited college/university	2.03	1.09	35.2%	40.8%	16.4%	0.9%	6.2%	0.6%
3. Member of professional/ educational organizations (ASCD, NSDC, etc.)	1.57	.875	61.3%	25.0%	9.6%	3.0%	0.8%	0.3%
4. Participation in Action Research project	1.34	.617	70.9%	25.7%	2.3%	0.9%	0.0%	0.3%
5. Partnership with a school agency	1.19	.454	82.7%	15.3%	1.7%	0.3%	0.0%	0.0%
Average Tier III	1.69	.548						
Average Tier 1 – 3 Brokerage	2.74	.449						

Table 4.15 Summary of Brokerage and Closure Factors by School ID (mean per variable)

School ID	Shared Vision	Information exchange	Trust	Total Closure	Tier 1	Tier 2	Tier 3	Total Brokerage	Mean Composite Growth
105	4.6	4.1	4.5	4.4	3.6	2.2	1.5	2.5	92.4
106	4.6	3.9	4.6	4.4	3.9	2.2	1.7	2.7	78.5
111	4.2	3.2	4.1	3.8	3.7	2.3	1.8	2.7	98.2
112	4.8	4.6	4.7	4.7	4.2	2.2	1.7	2.8	73.9
114	4.4	3.6	3.8	3.9	4.1	2.2	1.7	2.8	86.9
116	4.5	3.8	4.4	4.2	3.9	2.4	1.6	2.8	87.9
120	4.5	3.7	4.4	4.2	4.0	2.4	1.6	2.8	85.4
121	4.6	4.3	4.7	4.5	3.6	2.3	1.4	2.6	81.2
124	4.8	4.1	4.9	4.6	4.4	2.6	1.8	2.8	77.4
126	4.7	4.1	4.5	4.4	4.0	2.2	1.7	2.7	92.2
127	4.9	4.5	4.7	4.7	4.0	2.5	1.8	2.8	90.7
132	4.3	3.9	4.1	4.1	3.6	2.3	1.4	2.6	70.0
135	4.8	4.5	4.7	4.7	4.3	2.4	2.0	3.0	98.8
137	4.8	4.1	4.5	4.5	4.5	2.1	2.4	3.0	61.6
142	4.2	3.5	4.1	3.9	4.3	2.6	1.9	3.0	82.3
143	4.5	4.0	4.4	4.3	3.8	2.3	1.5	2.6	77.8
145	3.8	2.8	3.3	3.3	3.8	2.4	1.8	2.8	56.7
146	4.4	4.1	4.2	4.2	3.8	1.9	1.5	2.5	81.1
148	4.4	3.8	4.2	4.1	4.2	2.2	1.9	2.8	83.3
149	4.6	3.7	4.3	4.2	4.0	2.5	1.8	2.9	113.8
151	4.6	3.3	4.1	4.0	3.5	2.0	1.8	2.5	95.6
153	4.6	3.8	4.4	4.2	3.5	2.0	1.4	2.4	90.1
154	4.7	4.3	4.5	4.5	4.0	2.4	1.8	2.8	81.9
155	4.3	4.2	4.4	4.3	3.9	2.0	1.7	2.6	93.7
157	4.3	4.0	4.4	4.2	4.0	2.2	1.9	2.8	82.0
District	**4.5**	**3.9**	**4.4**	**4.2**	**3.9**	**2.3**	**1.7**	**2.7**	**84.7**

Table 4.16 – Factor Analysis

Pattern Matrix[a]

	Factor		
	1	2	3
sv1		.702	
sv2		.984	
sv4		.720	
ie1	.882		
ie2	.901		
ie3			.791
ie4			.554
trust1	.702		
trust2	.718		
trust5	.844		

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

4.17 Scree Plot

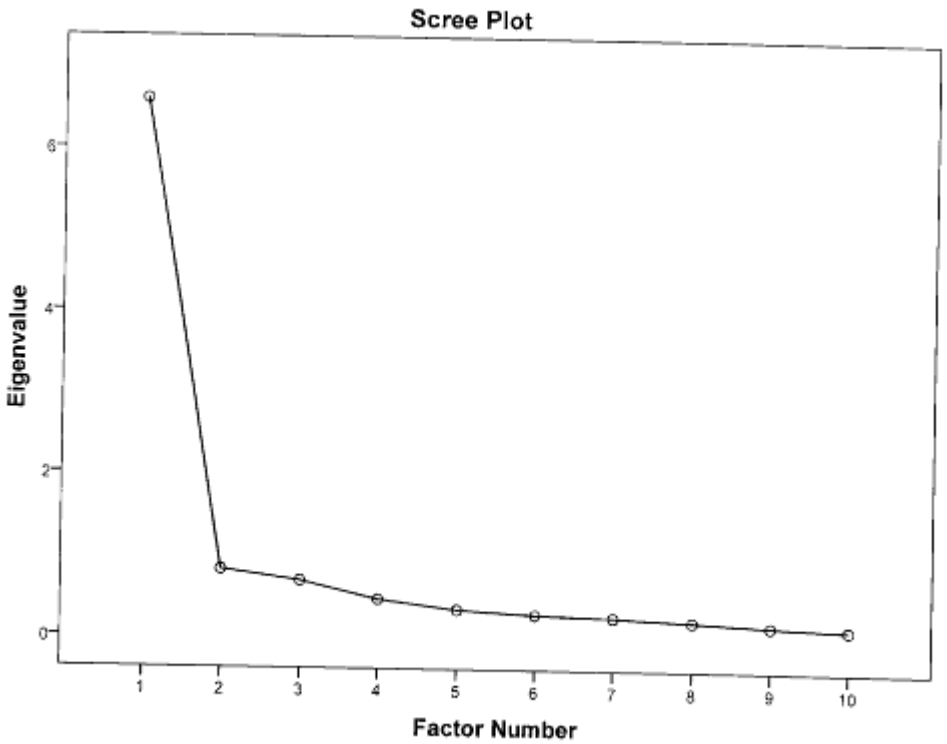

Table 4.19 - OLS Models Predicting Effects of Brokerage and Closure on Student Reading Growth

	Model 1		Model 2		Model 3	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
School Controls						
School Fixed Effects	Not Shown #				Not Shown #	
Composite Score Control			0.138 **	0.018	0.162 **	0.027
Student Characteristics in PLCs						
Percent of student gender					14.405	30.822
Percent of English Language Learners					7.319	58.634
Percent of white students					1.545	1.659
Percent of hispanic students					0.001	0.654
Percent of black students					-0.365	0.749
Percent of non-white students					1.770	1.618
Percent on Free or reduced price lunch					0.740	5.147
Percent on Free lunch					-0.079	0.545
Percent not on free or reduced price lunch					0.362	5.277
Percent of Special education students					0.959	0.653
Percent of gifted education students					0.849	0.235
Percent of non-sped or gifted students					-0.006	0.875
PLC Controls (averages)						
Average years teachers in PLC have taught					-0.323	3.644
Years teachers in PLC have taught in current district					1.742	3.806
Years teachers in PLC have taught in current school					-0.215	2.993
Years teachers in PLC have taught current grade					-4.504	2.843
Years teachers in PLC have taught together					1.343	2.109
Social Capital						
Closure						
Shared Vision						
Information Exchange						
Trust						
Brokerage						
Tier I Brokerage						
Tier II Brokerage						
Tier III Brokerage						
Adjusted R^2	0.057		0.338		0.388	
F	0.340		2.780 **		1.800 **	

** Significant at 0.010, * Significant at 0.050, # - Denotes School Fixed Effects not shown due to space limitations.

Table 4.19 - OLS Models Predicting Effects of Brokerage and Closure on Student Reading Growth

	Model 4		Model 5	
	Coeff.	Std. Err.	Coeff.	Std. Err.
School Controls				
School Fixed Effects			Not Shown #	
Composite Score Control			0.162 **	0.029
Student Characteristics in PLCs				
Percent of female students			17.468	30.610
Percent of English Language Learners			-15.395	58.543
Percent of white students			1.532	1.611
Percent of hispanic students			0.096	0.636
Percent of black students			0.541	0.735
Percent of non-white students			1.516	1.569
Percent on Free or reduced price lunch			-1.127	5.048
Percent on Free lunch			-0.543	0.551
Percent not on free or reduced price lunch			-1.627	5.183
Percent of Special education students			0.933	1.001
Percent of gifted education students			0.191	0.336
Percent of non-sped or gifted students			1.084	0.741
PLC Controls (averages)				
Average years teachers in PLC have taught			-1.150	3.771
Years PLC teachers have taught in current district			2.148	3.913
Years PLC teachers have taught in current school			-0.369	3.121
Years PLC teachers have taught current grade			-4.633	2.942
Years PLC teachers have taught together			0.879	2.156
Social Capital				
Closure				
Shared Vision	14.759 *	6.233	13.188 *	6.369
Information Exchange	-6.359	3.867	-8.607 *	4.245
Trust	-0.436	5.503	-0.246	5.860
Brokerage				
Tier I Brokerage	8.082 *	4.550	10.201 *	4.932
Tier II Brokerage	1.517	5.924	5.772	6.495
Tier III Brokerage	-8.824 *	5.120	-8.654	5.918
Adjusted R^2	0.083		0.463	
F	2.300 **		1.990 **	

** Significant at 0.010, * Significant at 0.050, # - Denotes School Fixed Effects not shown due to space limitations.

Table 4.20 - Correlation Matrix of Study Variables

	Sample (n=162)											
	Mean	Std. Dev	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Reading Comprehension growth (pretest - posttest)	29.728	27.783	1.000									
(2) Reading Comprehension pretest	315.827	110.664	0.498 ***	1.000								
(3) Reading Comprehension Posttest	345.555	126.812	0.654 ***	0.982 ***	1.000							
(4) Percent males of student gender	0.484	0.074	0.029	0.012	0.017	1.000						
(5) Percent of English Language Learners	0.113	0.111	0.079	-0.184 **	-0.143	-0.001	1.000					
(6) Percent of white students	66.456	18.777	-0.083	0.227 ***	0.179 **	0.008	-0.773 ***	1.000				
(7) Percent of hispanic students	16.484	12.631	0.087	-0.187 **	-0.143	-0.019	0.868 ***	-0.841 ***	1.000			
(8) Percent of black students	8.984	7.401	-0.004	-0.243 ***	-0.213 ***	0.006	0.365 ***	-0.720 ***	0.354 ***	1.000		
(9) Percent of non-white students	33.657	18.821	0.089	-0.223 ***	-0.175	-0.018	0.769 ***	-0.997 ***	0.844 ***	0.712 ***	1.000	
(10) Percent on Free or reduced price lunch	41.076	23.437	0.034	-0.327 ***	-0.278 ***	-0.008	0.691 ***	-0.890 ***	0.788 ***	0.617 ***	0.890 ***	1.000
(11) Percent on Free lunch	8.990	6.440	0.054	-0.175 **	-0.141	-0.022	0.324 ***	-0.475 ***	0.405 ***	0.297 ***	0.483 ***	0.606 ***
(12) Percent not on free or reduced price lunch	58.888	23.455	-0.033	0.329 ***	0.280 ***	0.007	-0.695 ***	0.892 ***	-0.790 ***	-0.618 ***	-0.892 ***	-1.000 ***
(13) Percent of Special education students	8.403	5.075	0.167 **	0.376 ***	0.365 ***	-0.078	-0.015	-0.054	-0.027	0.114	0.047	0.052
(14) Percent of gifted education students	3.978	10.775	0.036	0.145	0.134	0.016	-0.134	0.231 ***	-0.200 **	-0.105	-0.230 ***	-0.193 **
(15) Percent of non-sped or gifted students	88.774	7.678	-0.234 ***	-0.616 ***	-0.589 ***	-0.011	0.160 **	-0.165 **	0.207 ***	0.067	0.169 **	0.223 ***
(16) Average years teachers in PLC have taught	4.257	1.201	0.034	0.118	0.111	0.060	-0.049	0.127	-0.101	-0.072	-0.123	-0.157 **
(17) Years teachers in PLC have taught in current district	3.635	1.318	0.045	0.125	0.119	0.019	-0.148	0.175 **	-0.205 ***	-0.063	-0.175 **	-0.194 **
(18) Years teachers in PLC have taught in current school	3.085	1.307	0.034	0.098	0.093	-0.002	-0.033	0.053	-0.117	0.022	-0.051	-0.051
(19) Years teachers in PLC have taught current grade	2.849	1.1477	-0.087	0.000	-0.019	-0.002	-0.141	0.178 **	-0.170 **	-0.073	-0.169	-0.155 **
(20) Years teachers in PLC have taught together	2.573	1.189	0.048	0.041	0.046	-0.029	-0.103	-0.063	0.029	0.029	0.065	0.023
(21) Shared Vision	4.544	0.561	0.213 ***	0.239 ***	0.255 ***	-0.009	-0.113	0.051	-0.027	-0.080	-0.046	-0.032
(22) Information Exchange	3.939	0.807	0.058	0.152	0.146	-0.003	-0.095	-0.020	-0.020	0.028	0.028	0.097
(23) Trust	4.007	0.762	0.172	0.207	0.218	-0.015	-0.106	0.048	-0.049	-0.051	-0.043	-0.006
(24) Tier I Brokerage	3.946	0.560	0.114	0.049	0.068	-0.049	0.154	-0.151	0.175 **	0.020	0.153	0.159 **
(25) Tier II Brokerage	2.269	0.397	0.029	-0.101	-0.082	0.047	0.142	-0.044	0.164 **	-0.112	0.047	0.114
(26) Tier III Brokerage	1.715	0.456	-0.077	-0.069	-0.077	0.081	0.091	-0.021	0.130	-0.087	0.020	0.061
(27) Total Closure	4.148	0.674	0.182 **	0.196 **	0.211 ***	-0.002	-0.093	0.011	-0.026	-0.022	-0.006	0.034
(28) Total Brokerage	2.747	0.345	0.087	-0.031	-0.008	0.012	0.193 **	-0.121	0.228 ***	-0.065	0.123	0.169 **

*** Significant at 0.010; ** Significant at 0.050.

Table 4.20 - Correlation Matrix of Study Variables

(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
1.000																	
-0.611 ***	1.000																
0.054	-0.049	1.000															
-0.042	0.193 **	0.098	1.000														
0.104	-0.225 ***	-0.789 ***	-0.306 ***	1.000													
-0.247 ***	0.157 **	0.004	0.027	-0.070	1.000												
-0.159 **	0.195 **	0.082	0.002	-0.126	0.820 ***	1.000											
-0.094	0.051	0.071	0.023	-0.086	0.674 ***	0.793 ***	1.000										
-0.173 **	0.155 **	-0.093	0.049	0.081	0.610 ***	0.618 ***	0.558 ***	1.000									
0.049	-0.024	0.021	-0.054	-0.003	0.307 ***	0.331 ***	0.395 ***	0.418 ***	1.000								
0.068	0.033	0.066	-0.036	-0.116	0.250 ***	0.157 **	0.107	0.177 **	0.103	1.000							
0.157	-0.096	0.055	-0.038	-0.026	0.118	0.161 **	0.241 ***	0.200 **	0.044	0.553 ***	1.000						
0.063	0.007	0.045	-0.074	-0.072	0.236 ***	0.205 ***	0.207 ***	0.154	-0.038	0.774 ***	0.687 ***	1.000					
0.171 **	-0.159 **	0.105	0.021	-0.043	-0.005	0.038	0.038	0.059	-0.030	0.169 **	0.370 ***	0.305 ***	1.000				
0.025	-0.113	-0.019	-0.076	-0.044	-0.098	-0.107	-0.115	-0.105	0.003	0.018	0.043	0.096	0.316 ***	1.000			
-0.009	-0.062	0.053	-0.044	0.060	-0.113	-0.277 ***	-0.265 ***	-0.204 ***	-0.094	0.130	-0.104	-0.084	0.233 ***	0.281 ***	1.000		
0.114	-0.033	0.046	-0.070	-0.055	0.208 ***	0.172 **	0.213 ***	0.141	0.015	0.866 ***	0.771 ***	0.969 ***	0.312 ***	0.073	-0.077	1.000	
0.115	-0.170 **	0.061	-0.045	0.022	-0.089	-0.113	-0.111	-0.080	-0.052	0.115	0.215 ***	0.207 ***	0.806 ***	0.753 ***	0.537 ***	0.203 **	1.000

*** Significant at 0.010; ** Significant at 0.050.